**UNITED STATES DISTRICT COURT**
**FOR THE DISTRICT OF NEW JERSEY**

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| **IN RE: JOHNSON & JOHNSON TALCUM POWDER PRODUCTS MARKETING, SALES PRACTICES, AND PRODUCTS LIABILITY LITIGATION**<br><br>**This document relates to: HILL et al. v. JOHNSON & JOHNSON et al. 3:18-cv-08344-FLW-LHG** | **MDL No. 2738 (FLW) (LHG)** |

**CERTIFICATION OF TAYJES SHAH, ESQ. IN SUPPORT OF PLAINTIFF LINDA HILL'S OPPOSITION TO DEFENDANTS JOHNSON & JOHNSON AND JOHNSON & JOHNSON CONSUMER INC.'S OMNIBUS MOTION FOR SUMMARY JUDGMENT**

Tayjes M. Shah, of full age, hereby certifies:

1. I am an attorney-at-law of the State of New Jersey and a member of the Miller Law Firm, LLC, attorneys for Linda Hill. As such, I am actively involved in the handling of this matter and base this Certification upon personal knowledge. I submit this Certification in support of Plaintiff's Memorandum in Opposition to Defendants' Motion for Summary Judgment.

2. Attached hereto as Exhibit A is a true and correct copy of the relevant portions of the Transcript of the Deposition of Linda Hill.

3. Attached hereto as Exhibit B is a true and correct copy of an image from the Johnson Baby Powder packaging.

4. Attached hereto as Exhibit C is a true and correct copy of an image of the Shower-to-Shower packaging.

5. Attached hereto as Exhibit D is a true and correct copy of the Expert Report of Laura M. Plunkett, Ph.D., DABT dated November 16, 2018.

6. Attached hereto as Exhibit E is a true and correct copy of a document produced in discovery bates numbered JOJO-MA2546-01298.

7. Attached hereto as Exhibit F is a true and correct copy of a document produced in discovery bates numbered JNJMX68_000009139.

8. Attached hereto as Exhibit G is a true and correct copy of a document produced in discovery bates numbered JNJMX68_000004346.

9. Attached hereto as Exhibit H is a true and correct copy of a document produced in discovery bates numbered JNJNL61_000062953.

10. Attached hereto as Exhibit I is a true and correct copy of a document released in a FOIA request to the FDA bates numbered Kazan_FDA_FOIA 000068.

11. Attached hereto as Exhibit J is a true and correct copy of a document produced in discovery bates numbered JNJ000037743.

12. Attached hereto as Exhibit K is a true and correct copy of the article by Lisa Girion, “Johnson & Johnson knew for decades that asbestos lurked in its Baby Powder” REUTERS, 12/14/2018.

13. Attached hereto as Exhibit L is a true and correct copy of a document produced in discovery bates numbered JNJ000024462-JNJ00002446.

14. Attached hereto as Exhibit M is a true and correct copy of a document produced in discovery bates numbered JNJ 000238236.

15. Attached hereto as Exhibit N is a true and correct copy of a J&J Press Release issued 5/19/2020.

16. Attached hereto as Exhibit O is a true and correct copy of a J&J Press Release 12/3/2019.

17. Attached hereto as Exhibit P is a true and correct copy of a J&J Press Release 4/27/2020.

I certify under penalty of perjury that the foregoing is true and correct.

Executed on July 9, 2021.

/s/ Tayjes M. Shah
Tayjes M. Shah, Esq.
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# EXHIBIT A

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY LITIGATION
THIS DOCUMENT RELATES TO:

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LINDA H. HILL, et al., MDL No. 16-2738 FLW-LHG

Plaintiff(s),

v.

JOHNSON & JOHNSON, et al., Case No. 3:18-cv-08344

Defendant(s).

----------x

REMOTE DEPOSITION OF LINDA H. HILL

Wednesday, January 20, 2021

11:01 a.m. EST

Reported by: Linda S. Kinkade RDR CRR RMR RPR CSR

A P P E A R A N C E S:

(All participants appeared remotely)

On Behalf of Defendants JOHNSON & JOHNSON, et al.:

Shook Hardy & Bacon L.L.P.
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By: Angela M. Seaton, Esq.
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On Behalf of Plaintiffs LINDA H. HILL, et al.:

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conversations, tell me what you reviewed.

A. The case information form and some photographs of Johnson & Johnson.

Q. Okay. When you say "photographs of Johnson & Johnson," were those photographs of the products?

A. Yes.

Q. Were they photographs of Johnson's Baby Powder or Shower to Shower or both?

A. Both.

Q. How many of those photographs did you review?

A. There might be 12.

Q. Did you review any advertisements for any Johnson & Johnson products?

A. There were a few advertisements, yes.

Q. Were the advertisements that you reviewed on videotape, film, or photocopies?

A. Photocopies.

Q. With regard to those advertisements, had you, prior to seeing them in connection with the deposition, had you ever seen them before?

A. Yes.

Q. Okay. And how do you know that you saw those exact advertisements?

A. Exact, I won't say. I have seen a few over the years.

Q. Okay. I don't want to put testimony in your mouth, but I want to make sure that I understand your answer. With regard to the advertisements that you reviewed, would it be fair to say that you in the past had seen advertisements like the ones you looked at?

A. That is correct.

Q. Okay. But you can't represent that the advertisements that you looked at to prepare for the depositions were the actual advertisements that you saw sometime in the past?

A. One or two of them, yes, I can say for sure.

Q. Okay. And tell me how it is that you can say for sure that those are the exact advertisements that you had seen?

A. One was a lady holding a baby and the other was a jingle.

Q. Okay. With regard to the lady holding the baby, can you describe that advertisement for me?

A. Without looking at the paper, just she was holding an infant in her arms.

Q. Okay. Was it for Johnson's Baby Powder?

A. Yes.
Q. Okay. Can you tell me when exactly you would have seen that advertisement?
A. I am unaware of -- not unaware. I do not know the date.
Q. Okay. Do you know where you saw that advertisement?
A. That one would have been on television.
Q. And how is it that you are able to testify for sure that that was the exact advertisement that you had seen on television?
A. From the photograph.
Q. Okay. And then with regard to the second advertisement that you say that you saw the advertisement, was that for Shower to Shower?
A. No, that was for the talcum powder.
Q. Okay. Can you describe that advertisement for me?
A. That was the jingle -- I don't remember word for word -- I do know that it's a feeling that you never outgrow. It was a song that they sang.
Q. Okay. And are you sure that you saw the exact advertisement with the jingle or you saw something that you think was like the jingle advertisement that you looked at?

A. Probably like, because what I remember the most is the jingle.

Q. Okay. Where would you have seen that advertisement?

A. On television.

Q. Do you know the year or years that you would have seen that advertisement on television?

A. No, I do not.

Q. Are you able to tell me with regard to either advertisement that you saw on television whether there was a specific program that you were watching when you saw the commercials?

A. I would not be able to tell you that, no.

Q. Okay. And, I'm sorry, I don't mean to ask you questions over and over again. With regard to either of those advertisements, are you able to give me a date range, even if you can't give me an exact date?

A. Somewhere between 1965 and 2004.

Q. Okay. But you're not able to be any more specific than that?

A. I do not recall any dates, no.

Q. Okay. Okay. Did you review any of your medical records to prepare for the deposition?

A. I did not have any medical records

materials reflecting any research that you might have done regarding talc and ovarian cancer. Do you have anything like that?

A. No, I do not.

Q. Did you ever do any kind of research either online or in some other fashion about talc or ovarian cancer?

A. No.

Q. I didn't mean to cut you off.

A. I do not recall doing research.

Q. Okay. Did you do some other kind of investigation about talc and ovarian cancer?

MR. SELDOMRIDGE: Object to form.

A. The only thing I did was look for an attorney to question what was going on.

Q. Okay. Do you know when you did the looking about an attorney?

A. Probably around August of 2013 -- 2016. 2016 was when I was looking for an attorney to talk to about the talcum powder.

Q. Okay. And how did you go about identifying a lawyer? Did you do that online or some other way?

A. Online.

Q. Okay. When you went online, did you use a search engine like Safari or Google?

A. Just Google.
Q. Do you remember what you typed in in order to identify lawyers?
A. I put down Johnson & Johnson talcum powder lawsuits and names popped up.
Q. Okay. Did you print out any of the material that you identified online at that time?
A. No.
Q. What prompted you to look up lawyers on the internet back in 2016?
A. My son informed me of an advertisement he had seen on TV.
Q. Okay. Which son is that?
A. Howard.
Q. What's Howard's last name?
A. Hill.
Q. What did Howard tell you about what he had seen on television?
A. Just that there was an advertisement stating Johnson & Johnson and he remembered me using it.
Q. Okay. When you did your search online about lawsuits involving Johnson & Johnson, did that search pull up any information about lawsuits that had actually been filed?

A. I do not recall that part exactly, no.

Q. Okay. Was there anything in those results that would have had information about jury verdicts?

A. I did not see any jury verdicts.

Q. Okay. Other than the search you did in 2016 to identify a talc lawyer, did you ever do any other kind of research either online or in some other way about talc and ovarian cancer?

A. No.

Q. Okay. Number 7 asks for any literature, which would be newspapers or articles, et cetera, that deals with Johnson's Baby Powder, Shower to Shower, your injuries or any defendant. Do you have anything like that?

A. No, I do not.

Q. Paragraph 8 asks for the names, addresses, and telephone numbers of persons who may have observed or recorded any events or observations pertaining to the allegations of this lawsuit. So I'm going to be more specific than that request.

Is there anyone that you can think of who could testify about when you used talc products, how you used the products, when you quit using the products, anything like that?

A. That would be my husband, Rex.

it says approximate year of first use 1965 and last use 2016. Do you see where I am?

A. Yes, I do.

Q. Okay. At some point did you change or -- I'm not asking this the correct way.

At some point did you remember that you had began using Johnson's Baby Powder in 1965 instead of 1978?

A. Yes, I did.

Q. Okay. And how is it that your memory changed during that time period?

A. In our discussion about --

Q. Stop, stop, stop. Don't tell me anything you talked about with your attorneys.

A. I realized that when I said it.

Q. That's okay. Like I said, Jeff and I are both here to make sure that we don't tread into areas we shouldn't go.

A. Let me rephrase.

Q. Okay.

A. My sister was born in 1965, and when I filled out the paperwork originally, I never even considered that portion of it, but we used Johnson & Johnson then also.

Q. Okay. So in 1965 went your sister was born

you would have been 14 years old; is that correct?

A. Yes, ma'am.

Q. Okay. And do you have a specific recollection of using Johnson's Baby Powder at age 14?

A. Absolutely. That's all my mother purchased.

Q. Okay. And then if we scroll down, you're asked about Shower to Shower, and you indicate that you used it but you didn't recall the dates of use; is that correct?

A. That's correct.

Q. I'm now going to pull up another Plaintiff Profile Form, and we will mark --

MS. SEATON: Linda Kinkade, did we mark the Plaintiff Profile Form that I just pulled up as an exhibit?

THE REPORTER: Yes, I had marked that as 3. I assumed that would be 3.

MS. SEATON: Yes, it is, and I already emailed that to you. Okay. Great.

Now I am going to pull up and forward what's titled in the email is Amended Plaintiff Profile, and it says Hill. And this is a document that your attorney provided to me this morning.

(Exhibit 4 marked for

your arms, what have you.

Once they were out of diapers, it was always on the counter, when we were in the bathroom or whatever, and they liked the smell of it, they used it, I used it, but, I mean, it was a daily thing from the time they were born until they were out of diapers, but I continued using Johnson & Johnson myself.

Q. Okay. And that's what I want to focus on. Setting aside your children and focusing only on you and your use of Johnson's Baby Powder on your own body, starting in 1978, how frequently were you applying Johnson's Baby Powder by yourself to your own body? Do you understand what I'm asking?

A. I understand. All I can say is frequently. I can't -- I do not recall how many times per day or daily. I know I used it a lot.

Q. Okay. From 1978 until you quit using the product in 2016, were there periods of time where you used Johnson's Baby Powder either more frequently or less frequently, or was your use of powder always about the same during that time frame?

A. I don't recall. It would depend on the weather, what you're doing, mode of dress.

Q. Okay. Did you ever use any Gold Bond or other medicated body powders?

Florida. What grade or what age were you when you left Florida and moved to Kansas?

A. I was about 14, 13 -- about 13 when we left Florida.

Q. Okay. I think in second grade you would have been about eight years old when you moved to Florida, and then 13 years old when you moved to Kansas?

A. Probably.

Q. Okay.

A. And then, what, 16 when we left there.

MR. SELDOMRIDGE: Ms. Hill, wait until a question is pending.

A. Okay.

Q. Just because, again, these dates kind of do tend to run together, you moved to Florida at about age 13 -- I'm sorry. You moved to Kansas at about age 13. About how old were you when you moved to the state of Georgia?

A. Probably 16.

Q. Okay. And then how old were you when you moved to the state of Virginia?

A. 17.

Q. Have you lived in Virginia since age 17 through the present?

A. Yes.
Q. When did you begin purchasing your own Johnson's Baby Powder?
A. Let's see. I started purchasing Johnson's Baby Powder in Kansas.
Q. Okay. About how old were you when you began purchasing your own Johnson's Baby Powder as opposed to someone else in your household purchasing it?
A. Probably in Georgia.
Q. Okay. And I'm maybe not asking a clear enough question. I'm not necessarily interested so much in what state you were living in at the time. I'm trying to understand about how old you were when you began purchasing your own Johnson's Baby Powder.
A. Sixteen.
MR. SELDOMRIDGE: If I may, to clarify, but it's my understanding, Ms. Hill, that you moved from Georgia back to Florida.
THE WITNESS: Yes, we did for a short period of time after that, you're correct, yes.
Q. Okay. Let's just go through and nail all of this down.
You were born in the state of Virginia, correct?

A. Yes.
Q. Why did you stop using Johnson's Baby Powder?
A. Because that's when I was -- had gotten cancer and I was unable to use anything.
Q. Did anyone tell you that you needed to stop using Johnson's Baby Powder?
A. No. I was told not to get my incision or anything in water or wet.
Q. Okay. So you were diagnosed with cancer in 2013, correct?
A. That's correct.
Q. Okay. So did you stop using Johnson's Baby Powder in 2013 and not 2016?
A. Yeah, that would be -- yeah, you're right, I did, 2013.
Q. Is when you quit using Johnson's Baby Powder.
A. Not 2016. I was incorrect on that.
Q. And that's fine. So after 2013 did you ever use any Johnson's Baby Powder again?
A. No.
Q. Okay. And with regard to why you quit using it in 2013, you mentioned something about your incision. Can you tell me some more about why you

ground, but I do want to make sure that I know everything about how you heard about an alleged connection between ovarian cancer and talc products.

You mentioned that your son Howard told you something about a connection. Can you tell me about that conversation?

A. He told me one day -- he watches TV that has commercials -- I do not -- and he said that he saw an ad on the TV that stated that talcum powder might be linked with ovarian cancer. And then --

Q. I'm sorry. I didn't mean to interrupt. Go ahead.

A. He said that he heard that ovarian cancer might be linked with the talcum powder, and it was Johnson & Johnson. And he said that's all you ever used. And I said, yeah. He said, well, that's who the lawsuit was with. So I got online and got to looking up attorneys and went from there.

Q. Okay. Any other, other than communications you've had with your lawyers, any other source for your belief that your cancer was caused by talc products?

A. Nope.

Q. Okay. At some point obviously you decided to file a lawsuit, correct?

Q. Okay. We're back to question 16, and it speaks to Talcum Powder Product Use. Do you see that?
A. Yes.
Q. Okay. And this is talking about Johnson's Baby Powder, correct?
A. Correct.
Q. Okay. And on (b) of 16 it states, approximate year of first use, 1965; is that correct?
A. Yes.
Q. Okay. And then (c) states, approximate year of last use, 2016. Do you see that?
A. Yes.
Q. You were diagnosed with ovarian cancer in 2013; is that right?
A. That's correct.
Q. After you were diagnosed with ovarian cancer, did you change the way that you used Johnson's Baby Powder?
A. Yes. I used it from the waist up.
Q. Okay. Do you know why you've changed the way that you use Johnson's Baby Powder?
A. He said not to get my incision wet or anything on it, and I still liked the feel of the powder at that time, but I was still using some of it. It helped with underarm.

Q. Ms. Hill, are you familiar with the image that you see depicted in front of you in the photograph?

A. I've seen that before, yes.

Q. You've seen that advertisement for Johnson's Baby Powder?

A. Yes, I have.

Q. Can you describe that advertisement to me?

A. That's somebody in the creek having a good time cooling off with Johnson's Baby Powder. I don't -- that one might have been on TV, but I think that particular one was in a magazine.

Q. Okay.

A. I remember one -- my husband and I were discussing, what was it, there was one about a lady in a shower, outside shower.

Q. Okay. And let me ask you a question. Is this image a fair and accurate representation of an ad for Johnson's Baby Powder that you've seen in the past?

A. Yes, it is.

Q. And did this advertisement assure you that the Johnson's Baby Powder was safe to use?

A. Yes, it did. It's been that way for 75 years, pure, white talcum ...

Q. Mrs. Hill, if I can ask the question. You just read part of the advertisement. And in the advertisement it says pure, white talc. Do you recall seeing that?

A. Yes, I do.

Q. And the fact that it was a pure talc, did that make you comfortable with using the product?

A. Yes, it did.

Q. And the image is set in a natural setting; is that correct?

A. That's correct.

Q. Okay. In fact, it even talks about you're one of the natural people.

A. Yes.

Q. Okay. Did the fact that the company advertised Johnson's Baby Powder as natural and pure assure you that the product was safe to use?

MS. SEATON: Objection to form. And so that I don't have to keep interrupting, I'm going to object to this entire line of questioning as leading. Jeff, if you're okay with a standing objection, I won't keep interrupting.

MR. SELDOMRIDGE: Unfortunately, you'll have to keep interrupting me.

MS. SEATON: Okay. Go ahead.

Q. Ms. Hill, you can respond.
A. It makes you feel safe and secure.
Q. And why? Why did it make you feel safe and secure?
A. Because it says it's pure, it's natural, it's good for you. What you get out of it.
MR. SELDOMRIDGE: I'm going to mark this as Exhibit 11.
(Exhibit 11 marked for identification: Photographic reproduction of product advertisement)
Q. Ms. Hill, do you see the image that's in front of you?
A. Yes, I do.
Q. Okay. And are you familiar with that image?
A. Yes, I have seen that one too.
Q. Okay. And where have you seen that image?
A. I used one of the coupons.
Q. Okay. And can you explain to me what the image is in front of you?
A. Johnson's Baby Powder, keeps you cool and fresh, a dollar off. Can't knock that one. I was an avid coupon person, still am, and, to me, that's --

# EXHIBIT B


EXHIBIT

Plaintiff-1

exhibitsticker.com

Plaintiff's Exhibit No.

P-49

exhibitsticker.com


16 4RB
We love babies.
And we understand how to soothe and relieve baby soft skin. That's why JOHNSON'S® Baby Powder is designed to gently absorb excess moisture helping skin feel comfortable. Our incredibly soft, hypoallergenic, dermatologist and allergy-tested formula glides over skin to leave it feeling delicately soft and dry while providing soothing relief.
WARNING: Keep powder away from child's face to avoid inhalation, which can cause breathing problems. Avoid contact with the eyes. For external use only.
To Use:
1. Shake powder directly into your hand, away from the face, before smoothing onto the skin.
2. Close tightly after use, store in a cool, dry place.
SAFETY TIP: Keep out of reach of children.
Do not use if quality seal is broken.
Ingredients: Talc, Fragrance
Our Babies Will Inherit Our Planet.®
Please Recycle.
US/Canada, 866-JNJ-BABY;
Outside US & Canada,
dial collect 215-273-8755
www.johnsonsbaby.com
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Division of Johnson & Johnson Consumer Companies, Inc.
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Talc Made in China
3 8137-003014 0
30019243

# EXHIBIT C


Sent from my iPhone

EXHIBIT

**Exhibit-3**

exhibitsticker.com

# EXHIBIT D

**RULE 26 EXPERT REPORT OF**
**LAURA M. PLUNKETT, PH.D., DABT**

Date: November 16, 2018

Laura M. Plunkett, Ph.D., DABT

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## I. Training and Qualifications

1. I am a pharmacologist, toxicologist, United States Food and Drug Administration (FDA) regulatory specialist and principal of a consulting company known as Integrative Biostrategies, LLC. Integrative Biostrategies, based in Houston, Texas, is a consulting firm that works at the interface of biological science, regulatory affairs and business decisions to provide its clients with science-based solutions to issues associated with product development and stewardship. Before joining Integrative Biostrategies in 2001, I was head of the consulting firm known as Plunkett & Associates. Attached as Appendix A is a copy of my curriculum vitae.

2. I am board-certified as a Diplomate of the American Board of Toxicology. I am a member of several professional organizations and have authored or co-authored numerous scientific publications. I have over twenty years of experience in the areas of pharmacology and toxicology and have worked in both government and academic research. I have taught pharmacology and toxicology at the undergraduate and postgraduate levels.

3. I received a B.S. degree in 1980 from the University of Georgia and a Ph.D. in pharmacology from the University of Georgia, College of Pharmacy in 1984. My doctoral research was focused on the area of cardiovascular pharmacology, and specifically dealt with delineating neurochemical mechanisms responsible for the cardiac toxicity of digitalis glycosides. My training required my understanding of the mechanisms of action and basic pharmacology of drugs from all classes.

4. From June 1984 through August 1986, I was a Pharmacology Research Associate Training (PRAT) fellow at the National Institute of General Medical Sciences, Bethesda, Maryland. I worked in a neuroscience laboratory of the National Institute of Mental Health. My research focused on the role of various brain neurochemical systems involved in the control of autonomic nervous system and cardiovascular function.

5. From September 1986 to June 1989, I was an Assistant Professor of Pharmacology and Toxicology in the medical school at the University of Arkansas for Medical Sciences, Little Rock, Arkansas, where I performed basic research in the areas of neuropharmacology and

toxicology as well as cardiovascular pharmacology and toxicology. I taught courses for both medical students and graduate students in pharmacology and toxicology as well as the neurosciences. As a pharmacologist, my work was directed towards understanding the biologic mechanisms of drug actions.

6. From December 1989 to August 1997, I worked for ENVIRON Corporation, first in the Arlington, Virginia office and then in the Houston, Texas office. I worked specifically within the health sciences group and most of my projects dealt with issues surrounding products or processes regulated by the FDA. During my consulting career (ENVIRON, Plunkett & Associates, and Integrative Biostrategies), I have worked on a variety of projects dealing with the regulation of products by the FDA, including human drugs (both prescription and over-the-counter drugs), veterinary drugs, biologics, medical devices, cosmetics, consumer products, dietary supplements and foods. I have advised my clients on regulatory issues and strategies for their products, designed preclinical and clinical studies for both efficacy and safety, advised clients on issues related to statements regarding efficacy and warnings for their products based on the current labeling regulations, and generally acted as a regulatory affairs staff for small companies in early stages of product development. Among the clients that I have consulted with have been cosmetic ingredient manufacturers and manufacturers of finished cosmetic products, both large and small companies. A tool and generally accepted methodology common to all my work as a consultant would be risk assessment, including many projects where risks related to exposure to chemicals in consumer products were at issue. Also, as part of my risk assessment work, I commonly review and rely on epidemiology data, as well as animal and *in vitro* data in order to assess risks to human health.

7. With respect to my experience that is directly relevant to the issues in this case, I have done a great deal of work on projects related to regulation of cosmetics and cosmetic ingredients. As part of my regulatory practice as a consultant over more than 25 years, I have consulted with cosmetic ingredient manufacturers and manufacturers of cosmetic products on issues related to ingredient safety, product safety, labeling claims, and general regulatory compliance issues which include US regulations and regulations in other countries. These projects have been for companies of different sophistication in terms of their knowledge of cosmetic regulatory compliance. In some cases, I have worked with large companies and provided advice

on the safety of ingredients used to manufacture cosmetic products. In other cases, I have given advice to the company as part of an initial commercialization process, where the client was trying to decide how to market their product, *e.g.*, as a cosmetic or a drug, as well as to determine if their product was safe for human exposure. Prior to this litigation, I have worked on the safety of talc itself. In the 1990's, I consulted with companies making condoms, which are classified as medical devices,[1] and provided scientific advice on the safety of talcum powder that was used on the surfaces of the devices as a dry lubricant. This work included my assessment of the scientific literature, including epidemiology, animal and invitro studies that discussed potential adverse health effects linked to talc exposure, including both local tissue toxicity and systemic toxicity.

8. Related to the issue of cosmetic ingredient safety is the issue of determining if that ingredient is "generally-recognized-as-safe", or "GRAS". In many of my projects, the issue of whether a consumer product ingredient is GRAS is critical to determining what type of toxicity testing is needed to establish that a product or an ingredient is safe for human use. Like the reviews performed on cosmetic ingredients by members of panels such as the Cosmetic Ingredient Review (CIR) panel (the role of the CIR process and its panel is discussed in more detail below), GRAS reviews that I have performed involved consideration of animal and human toxicity data, cellular and mechanistic data, human product experience reports, and the type and level of exposure that may occur when humans are exposed to the ingredient or product.

9. As a pharmacologist and board-certified toxicologist, much of my consulting work has related to understanding and explaining the mechanisms of action of chemicals of all types, as well as the toxic effects of these chemicals. I have expertise in pharmacokinetics, where I have designed clinical trials and analyzed pharmacokinetic data. I have taught pharmacology to medical students and graduate students. I have lectured to graduate students, law students and pharmacy students on FDA regulations as they apply to all types of FDA-regulated products, including cosmetics. Throughout my career, I have published dozens of peer-reviewed articles, which are listed in my curriculum vitae (Appendix A). I have authored a book chapter on FDA pharmacovigilance practices. I have served as a peer-reviewer for medical journals in my capacity as a pharmacologist and toxicologist. In litigation, I have provided expert testimony and been

[1] https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPCD/classification.cfm?ID=HIS

qualified by both state and federal courts in the areas of pharmacology, pharmacokinetics, toxicology, risk assessment and FDA regulations. A list of my previous testimony for the past five years is included as Appendix B.

## II. Information Reviewed and Methodology Employed

10. In the current case, I have been asked to provide opinions related to the human health hazards posed by exposure to talcum powder products and how those hazards relate to the regulatory requirements for marketing cosmetic ingredients and cosmetic products in the United States. This report is the third report I have prepared in the nationwide talc litigation. I am prepared to provide testimony on many of the topics addressed in my two earlier reports dated October 5, 2016 and August 29, 2018 as well as opinions contained in testimony during hearings, depositions, and trials. This new report contains discussion of additional documents, scientific literature, reports, and deposition testimony that has become available since preparing my original report in October 2016 and even my supplemental report in August 2018. To provide a general summary, the relevant materials I've reviewed during the course of continuing work in this litigation include the following:

a) scientific literature relating to the biological effects and toxic effects of talc and other constituents that are present in talc body powders;

b) the Food, Drug and Cosmetic Act (FDCA) and regulations of the U.S. Food and Drug Administration (FDA) relating to the development and marketing of cosmetic ingredients and finished cosmetic products;

c) publicly available information on safety assessments of talc and products containing talc; and

d) documents produced during the litigation that are, for example, internal company documents, depositions of company employees, reports of other experts in the litigation, or documents found on public sites.

It should be noted that most of the sources listed above are ones commonly used in my work as a pharmacologist, toxicologist, risk assessor, and United States Food and Drug Administration (FDA) regulatory specialist, including internal company documents that often outline what was known by a manufacturer concerning their product as well as outlining company

policies that relate to marketing of cosmetic ingredients and cosmetic finished products in the United States. Additionally, it is important to point out that I have had access to a large database of internal company documents, documents produced as part of the discovery process in the litigation, and that I have performed my own searches of this database as part of my work on the case. In other instances, I have directed others to perform searches on my behalf. Finally, the manufacturers that are relevant to my opinions include Luzenac, a talc ingredient manufacturer that is a part of the company known today as Imerys,[2] and Johnson & Johnson, the manufacturer of finished talc body powder products, *i.e.*, Johnson's Baby Powder™. Shower to Shower™ and Shimmer™. The other group that is relevant to my opinions in this case is the trade organization for the cosmetics industry known as the Personal Care Products Council (PCPC), a group that was formerly known as the Cosmetic, Toiletry and Fragrance Association (CTFA).

11. With respect to the methodology employed in forming my opinions for this report and my earlier reports, I used standard and generally accepted methods that apply in all my work as a pharmacologist and toxicologist that is related to assessing the safety of products, both litigation and non-litigation projects. The tool I use for safety assessment is a method known as human health risk assessment. Toxicologists routinely assess risks to human health related to exposure to chemicals in the everyday environment using the risk assessment process. In fact, toxicology is the scientific core of risk assessment. Risk assessment is a methodology that has been used for decades by a wide variety of governmental bodies to evaluate the safety of chemicals encountered in the everyday environment and to identify the potential adverse health effects from such chemical exposures. In 1983, the National Research Council (NRC) detailed the steps for risk assessment and described the methodology that is in use today as four basic steps: hazard identification, dose-response assessment, exposure analysis, and characterization of risks (NRC, 1983). As a result, risk assessment is a standard tool used by toxicologists when they are trying to determine if exposure to a chemical(s), or a product, poses a risk to human health. Therefore, as with any project I perform involving safety assessment, I use risk assessment as a tool. The methodology of human health risk assessment is a tool described in the *Reference Manual on*

[2] Since 1989, Imerys Talc America, Inc. ("Imerys") or one of its predecessor companies have supplied talc to Johnson & Johnson for its talcum powder products. These predecessor companies include Cyprus Talc Corporation, Luzenac America, Inc., and Rio Tinto Group. Throughout this report, these entities should be considered synonymous with Imerys

*Scientific Evidence, Third Edition* (NRC, 2011) which is a resource developed for courts when evaluating methodology used by scientists in litigation projects.

12. The first step in any risk assessment is the one I employed here, *i.e.*, identifying, collecting, reviewing, assessing, and evaluating data from the peer-reviewed scientific literature. This literature is used as the basis of the information employed in the first two steps of the risk assessment, *i.e.*, hazard identification and dose-response assessment. In this case, that literature review involved extensive searching of the published literature that described the effects of talc and talc-based products on some aspect of human health. I used available databases to systematically search the published literature for all relevant literature. The papers I identified described the effects of talc on living organisms, tissues and cells. Some of the resources I identified were textbooks and government documents that provided overviews of the human health risks associated with talc exposure. Also included in my searches were other compounds or chemicals that are constituent parts of talc-based body powders. I had to analyze and evaluate the relevant information. For this process I employed another tool and generally accepted methodology known as a "weight-of-the-evidence" assessment. A weight-of-the-evidence assessment involves evaluating individual studies and determining what the studies describe, when considered as a whole. Therefore, weight-of-the-evidence methods were critical to defining the literature that identified the hazards of talc exposure as well as defining the dose-response relationship between talc exposure and the risk of adverse health effects. The third step in a risk assessment is exposure assessment. In the current case, I was not attempting to define any specific exposure in quantitative terms but instead to use exposure assessment to define the type of information relevant to the product in question, a talc-based body powder. Therefore, exposure assessment involved defining the routes of human exposure that would be relevant for evaluating the risks posed by use of the powders. The last step in a risk assessment is risk characterization, a process where the scientist generates some statement about risk. This final step explains the outcome of the risk assessment in terms that explain the potential impact on health of the public, for example.

13. I was trained in the use of these methods as part of my undergraduate, graduate, and postdoctoral work in pharmacology and toxicology, as well as while working as a consultant

in human health risk assessment. Weight-of-the-evidence methodology, is used as part of regulatory decision making by regulatory and scientific bodies such as the FDA,[3] the U.S. Environmental Protection Agency (EPA),[4] and the U.S. Occupational Safety and Health Administration (OSHA),[5] and the World Health Organization (WHO) and the International Agency for Research on Cancer (IARC).[6] The *Reference Manual on Scientific Evidence* also describes the use of weight-of-the-evidence by experts in the process of evaluating a body of data or studies.[7]

14. At the end of this report is attached a list of the published scientific articles cited throughout this report. Attached to this report as Appendix C is a complete list of all materials that I have reviewed and/or relied upon in forming my opinions in this case. All the opinions expressed in this report are based on a reasonable degree of scientific certainty. I reserve the right to supplement and refine my opinions as additional relevant information becomes available.

## III. Talcum Powder Products: The Regulatory Process in the United States

15. Johnson & Johnson talcum powder products entered the marketplace in 1894. At that time, the FDA did not exist and there was no law in place related to any type of product that is currently addressed by FDA regulations. Prompted by a series of food contamination issues, the Pure Food and Drugs Act was passed by Congress and signed into law in 1906 (Janssen 1981). This initial law was enforced by the Agriculture Department's Bureau of Chemistry and prohibited the introduction of "misbranded" and "adulterated" foods, drinks, and drugs into interstate commerce. In 1930, the Bureau of Chemistry became the Food and Drug Administration. In the decades that followed the passage of the 1906 law, scientists involved in administration of the law

[3] e.g., http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/ucm079257.pdf; http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm074916.pdf; http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm079240.pdf

[4] e.g., https://www.epa.gov/sites/production/files/2015-06/documents/acephate-103301_2015-06-29_txr0057153.pdf; https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=23160&CFID=65932199&CFTOKEN=24176705; https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=71993&CFID=65932266&CFTOKEN=97071893

[5] https://www.osha.gov/weightofevidence/woe_guidance.pdf

[6] http://www.who.int/phe/news/events/international_conference/Session2_DrStraif.pdf

[7] The *Reference Manual on Scientific Evidence*, 3rd Edition. National Research Council. 2011. Washington, DC: The National Academies Press. https://doi.org/10.17226/13163.

were confronted with a series of public safety issues that included notably a drug-related tragedy (Sulfanilamide Elixir) and a cosmetic-related tragedy (Lash-Lure). In the case of the cosmetic product, a coal tar-based eyelash dye called Lash Lure caused serious eye injuries that included blindness and one death. Yet, it was the drug-related tragedy, where 107 people died, that purportedly led to passage of Food, Drug & Cosmetic Act (FDCA) in 1938 (Berger and Berger, 2017). Before the passage of the FDCA, there was no US law that addressed cosmetic safety specifically; the FDCA extended regulatory authority to cosmetics for the first time. The provisions of the 1938 Act that brought cosmetics under the purview of the FDA have changed little over the decades, in contrast to the multiple substantive changes in the law as it relates to other FDA-regulated products (*e.g.*, drugs, foods and medical devices).

16. As discussed in a review paper written in 1978 by the Commissioner of Food and Drugs (FDA), Dr. Kennedy, the author describes the process by which regulation of various product types evolved over the decades since 1938 (Kennedy, D. 1978). Dr. Kennedy describes how FDA moved forward over the years toward greater authority over drugs and medical devices, as well as foods, but not with respect to cosmetics. He describes the need for FDA to engage in something he termed "movement backward toward the source", where such actions are ones where FDA works to eliminate a public health threat using its existing statutory and research resources. As he stated in his paper:

> *"It is only in regard to cosmetics-regulated through the Bureau of Foods- that FDA has been frustrated in the necessary movement backward toward the source. While the Agency is charged with assuring that cosmetics are not harmful under conditions of use and are truthfully packaged and labeled, an anomaly in the Food, Drug, and Cosmetic Act places the burden on FDA to prove harm rather than on industry to prove safety, as is true with drugs and food additives…A study conducted by the General Accounting Office (GAO) pointed out that there is increasing evidence that some cosmetic products and ingredients carry a significant risk of injury to consumers and that, despite such evidence, efforts to regulate cosmetics have been hampered by the lack of adequate legislative authority…FDA's limited ability to reach back toward the source inhibits the Agency's ability to carry out risk assessment of cosmetic ingredients."* (see pages 611-612 of Kennedy, 1978).

The regulatory standards for cosmetics have remained essentially unchanged since the 1970's with some exceptions being: (1) in 1975 the FDA stipulated the need for warning statements on the label of cosmetics products and set forth the standards (March 3, 1975; 21 CFR 740); (2) in 1992 FDA initiated voluntary filing of cosmetic product composition statements for cosmetic products (57 FR 3129, Jan. 28, 1992; 21 CFR 720); (3) in 1974 FDA began voluntary registration of cosmetic manufacturing operations (39 FR 10059, Mar. 15, 1974; 21 CFR 710); and (4) in 1974 FDA required certain specifications for cosmetic labeling (39 FR 10056, Mar. 15, 1974; 21 CFR 701). As stated in 2012 testimony before Congress (CRS, 2012), *"FDA's authority over cosmetics is less comprehensive than its authority over other FDA-regulated products with regard to GMP; premarket notification, clearance, or approval; testing; and mandatory risk labeling."* The limitations on FDA authority over cosmetics is important in this case given that the Agency relies on cosmetic manufacturers and ingredient suppliers to ensure that the products marketed are safe for human use.

17. Over the years, the U.S. General Accounting Office (GAO) has been involved in evaluation of cosmetic regulations (GAO, 1978). The mission of the GAO is stated as follows: *"GAO exists to support the Congress in meeting its constitutional responsibilities and to help improve the performance and ensure the accountability of the federal government for the benefit of the American people."*[8] In its 1978 report, the GAO provided some important observations and suggestions on how to improve the process for protecting public health. The GAO reached the following conclusions in 1978 regarding cosmetic regulations:

> *"In spite of the significant risk of injury to consumers, the Food and Drug Administration (FDA) does not have an effective program for regulating cosmetics. The act does not authorize FDA to require manufacturers to register their plants or products, file data on ingredients, file reports of cosmetic-related injuries, or test their products for safety. Also, exemptions in the act do not permit effective regulation of coal tar hair dyes. FDA has not effectively used its existing authority. For example, it has not inspected most manufacturers' plants or sampled products for compliance with the act; it has established regulations governing the use of only 11 ingredients used in cosmetics; the safety of about*

[8] https://www.gao.gov/dsp/3mission.html

> *25 color additives has not been established; and it has had difficulty developing appropriate tests to be used by manufacturers in evaluating safety."*

The overall conclusion reached is reflected in the title of the report: "*Lack of Authority Hampers Attempts to Increase Cosmetic Safety*". The GAO also made recommendations that were stated as follows:

> *"The Congress should authorize the Food and Drug Administration to require cosmetic manufacturers to prove the safety of their products. Because the agency does not have enough authority to effectively regulate cosmetics, products are being marketed which may pose a hazard to consumers. About 125 ingredients available for use in cosmetics are suspected of causing cancer, and about 25 are suspected of causing birth defects. Although many of the reported adverse effects have not been verified, 30 of the ingredients are known to cause cancer in humans or animals or contain impurities known to cause cancer. The ability of these ingredients to cause toxic effects through cosmetic use has not been determined. Manufacturers do not have to determine the safety of their products before selling them or tell the Food and Drug Administration what products they are selling and what ingredients are used in them. Many manufacturers have not voluntarily given such Information to the agency. As a result, a hazardous cosmetic can be marketed until the Food and Drug Administration obtains information to prove that the product may be injurious to users."*

The discussion and findings by the GAO in 1978 are important context for understanding the responsibilities of cosmetic manufacturers and suppliers of cosmetic ingredients, such as Johnson & Johnson and Imerys, with respect to talcum powder products. The lack of FDA authority in key areas of cosmetic regulations that existed in the past, and exist even today, means that companies that market cosmetic products and ingredients must ensure that the products they sell are safe for use before they are marketed and continue to be safe for use as new scientific information becomes available.

18. With this historical context in mind, at issue in this litigation are cosmetic products known as talcum powder products. As mentioned above, current law does not require that

cosmetics or cosmetic ingredients have FDA approval before they enter the market.[9] Once cosmetic ingredients and products are marketed and placed into interstate commerce, the two important laws that pertain to the industry include the FDCA and the Fair Packaging and Labeling Act (FPLA). The FDCA defines cosmetics by their intended use, in the same way that other products (*i.e.*, drugs, device, foods, *etc.*) are regulated according to their intended use. A cosmetic is defined as follows: *"The term cosmetic means (1) articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance, and (2) articles intended for use as a component of any such articles; except that such term shall not include soap."* (FDCA Section 201(i)). Among the products included in this definition are skin moisturizers, perfumes, lipsticks, fingernail polishes, eye and facial makeup, cleansing shampoos, permanent waves, hair colors, and deodorants, as well as any ingredient intended for use as a component of a cosmetic product. The FPLA, enacted in 1967, directed the Federal Trade Commission (FTC) and the FDA to issue regulations requiring that *"consumer commodities"* be labeled to disclose net contents, identity of commodity, and name and place of business of the product's manufacturer, packer, or distributor.[10] In the case of cosmetics, the FDA was given responsibility for administering the law and for issuing regulations regarding labeling for foods, drugs, devices, and cosmetics.

19. Since the FDCA does not require that cosmetics undergo any type of approval by FDA before marketing, the focus of the regulations that have existed since passage of the law in 1938 has been to ensure that cosmetics are not *"adulterated"* and *"misbranded"*. The term *"adulterated"* with respect to cosmetics means that the product or an ingredient is known to pose a risk to human health, or the product is known to be unsanitary, or the product contains a prohibited ingredient, or the product is manufactured under unsanitary conditions (Jackson, E.M. 1995). The term *"misbranded"* means that the cosmetic product has false or misleading labeling, that the labeling fails to state information required by FDA (*i.e.*, name of product, net weight or amount of product, name of the company marketing the product, ingredients listed in descending

[9] https://www.fda.gov/cosmetics/guidanceregulation/lawsregulations/ucm074162.htm
[10] https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/fair-packaging-labeling-act

order of amount, and any warnings about safety issues that the company is aware exist), or that the product packaging is misleading to the consumer in some way in terms of what it contains. FDA has published guidance on how to label cosmetic products.[11]

20. Unlike human drug products, both prescription and over-the-counter (OTC) products, there is no risk-benefit assessment performed as a part of a decision to allow a cosmetic product to be marketed. Cosmetics are not recognized to provide any health benefit, and, as a result, any significant health risks or concerns are unacceptable for such products. In the case of a drug, both FDA and the public understand that in some cases risks can be acceptable so long as there is some benefit assessment that outweighs that risk assessment. There are some products that are both cosmetics and drugs, and in those cases, the manufacturer must comply with both cosmetic and drug regulations.

21. It is the cosmetic manufacturer that is responsible for ensuring that its product and its ingredients are safe for use. The cosmetic ingredient supplier also has a duty to provide warnings related to the safety of the ingredients supplied to finished product manufacturers (*Federal Register* 40(42) March 3, 1975). The FDA does no testing itself. Instead, the FDA relies on companies to conduct all testing to ensure that the finished product, and its ingredients, are safe for human use. Therefore, as is stated by FDA:

> *"Companies and individuals who manufacture or market cosmetics have a legal responsibility to ensure the safety of their products. Neither the law nor FDA regulations require specific tests to demonstrate the safety of individual products or ingredients. The law also does not require cosmetic companies to share their safety information with FDA."*[12]

As a result, manufacturers have a duty to conduct whatever testing is necessary to ensure the safety of their products and ingredients.

[11] http://www.fda.gov/downloads/Cosmetics/Labeling/UCM391202.pdf
[12] http://www.fda.gov/Cosmetics/GuidanceRegulation/LawsRegulations/ucm074162.htm

22. Another aspect of the FDA regulations pertaining to cosmetics that needs to be discussed is the standard for establishing a warning that would be placed on the labeling of a cosmetic product. It is important to realize that the standard for placing a warning on a cosmetic product is very different than the standard applied to products such as drugs. The standard applied to human prescription drug products in the US is as follows (21 CFR 201.57): "*The labeling must be revised to include a warning about a clinically significant hazard as soon as there is reasonable evidence of a causal association with a drug;* ***a causal relationship need not have been definitely established****." [****emphasis*** *added]* In the case of cosmetic products and their ingredients, however, the warning standard is as follows: (21 CFR 740.1):

> *740.1 Establishment of warning statements*
>
> *(a) The label of* ***a cosmetic product shall bear a warning statement*** *whenever necessary or appropriate* to prevent a health hazard *that* ***may be associated*** *with the product.*
>
> *[****emphasis*** *added]*

This means that, unlike drugs, cosmetics are expected to carry warnings based on a standard of a possibility of health hazard, not on having evidence of a causal association between a health effect and the cosmetic product or ingredient. Not requiring proof of a cause and effect relationship is consistent with FDA's policy with drugs where causation does not need to have been proven before a warning may be placed on a drug product (see 21 CFR 201.57(c)). This issue is important in the current case involving talc cosmetic products and cancer risk because of the large body of evidence that developed over the decades providing evidence of increased risk of cancer with perineal use of talc body powder products---an important health hazard. Based upon the totality of the evidence reviewed there is **more than a possibility of a human health hazard**; these issues will be discussed in more detail below.

23. In the case of cosmetics, this reliance on industry for product safety assessments is especially important given that there is no Center for Cosmetics at FDA. Instead, the cosmetics regulations are enforced by the Office of Colors and Cosmetics that is within the Center for Food Safety and Applied Nutrition (CFSAN). As FDA has admitted, although the FDA has ways to monitor cosmetic products, available safety information is often limited (http://www.fda.gov/AboutFDA/Transparency/Basics/ucm262353.htm). The methods available

to FDA for monitoring cosmetic products include: (1) voluntary cosmetic registration program (VCRP); (2) inspections of facilities that voluntarily register with FDA; (3) surveys of product; (4) information conveyed in Cosmetic Ingredient Review (CIR) expert panel reviews;[13] and (5) spontaneous reports from consumers. In the case of the VCRP program, companies are not legally required to tell FDA anything about their products and the type of safety data that exists. Inspection of facilities is also not legally mandated, and, as acknowledged by FDA, due to limited resources "only a few establishments are inspected each year and just a fraction of imports are physically examined". Similarly, FDA has conducted surveys of marketed products by buying them and then examining them. This has mainly been done after some problem has been identified. The CIR panel process is an industry-funded process that typically is undertaken based on some impetus for review that is initiated within government, industry or the public. The spontaneous reporting by consumers to FDA is not required by law, and many consumers are unaware of the existence of the process for cosmetics.

24. There are some important constraints on FDA's authority as it relates to cosmetics. For example, any product recall of a cosmetic for a safety reason must be a voluntary action initiated by manufacturers or distributors to remove products from the market that may pose a hazard, that are marketed in a deceptive manner, or that are defective in some way (21 CFR 7.40(a)).[14] FDA can request such recalls but cannot require such recalls.

25. Unlike products such as drugs, devices and even foods, cosmetic manufacturers are not required to register the facilities where the cosmetics are manufactured.[15] This means that although FDA has the authority to inspect such facilities, unless the facility is registered, no inspections are made. In circumstances where an issue of product contamination or adulteration comes to light, FDA does have the authority to go and inspect facilities. This means that FDA is in the role of responding to problems, not preventing problems before they occur. Again, this is very different than the role FDA plays for other types of products.

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[13] Although the FDA has access to, and can evaluate, the findings of a CIR review, such as the review for talc, the FDA does not adopt CIR findings. (See deposition testimony and exhibits of Dr. Linda Loretz dated October 2, 2018)

[14] https://www.fda.gov/cosmetics/complianceenforcement/recallsalerts/ucm173559.htm

[15] https://www.fda.gov/cosmetics/registrationprogram/default.htm

26. In 1997, FDA issued guidance to industry related to Good Manufacturing Practices (GMPs) for cosmetics.[16] The guidance has been updated as late as 2013. This guidance is non-binding but does lay out FDA's thinking in terms of how to properly manufacture, ensuring that cosmetics and their ingredients are safe for use in humans. This situation is unlike other FDA regulated products where there are mandatory GMP regulations that are actively enforced by FDA (*i.e.*, in the case of drugs, devices, and even foods).

27. Based on the general lack of regulatory oversight for cosmetics, it cannot be assumed that all marketed cosmetic ingredients and products are safe for human use. Additionally, it is likely that the public is unaware that FDA has strict limitations on its ability to ensure protection of public health when it comes to cosmetic products. With these regulatory limitations in mind, the chemical components of talc body powders and their hazards were considered and are discussed below with respect to the health hazards linked to the chemical components, the evidence linking cancer with exposure to chemical components of talcum powder products, and the need to provide warnings to consumers regarding health risks that may be linked to the chemical components of talcum powder products.

## IV. Chemical Components of Talcum Powder Products and Their Hazards

28. The chemical nature of talc has been reviewed (*e.g.*, USEPA, 1992; IARC, 2010). Talc (CAS No. 14807-96-6), or magnesium silicate monohydrate, is a naturally occurring hydrous magnesium silicate compound with the chemical formula $3MgO•4SiO_2$. Like other minerals, talc can be classified by its structure, which consists of water molecules trapped between silicate sheets. This structure imparts the "feel" to talc, which is often referred to as slippery on the skin. Talc crystals are formed when these sheets stack upon each other. Talc can occur in non-plate forms as well. For example, asbestiform talc exists in nature, where asbestiform means the talc is in the shape of a fiber similar to the structure of asbestos. The structure of the talc particles, platy or fibrous, and the size of the talc particles, influence the toxicity potential of the talc powder.

[16] http://www.fda.gov/Cosmetics/GuidanceRegulation/GuidanceDocuments/ucm353046.htm

29. As a mineral, talc is mined in countries around the world, including in the United States. Talc can be prepared to various specifications depending on the purity desired. Talcum powder products such as the ones manufactured and sold by Imerys and Johnson & Johnson were mainly platy talc but varied in their level of purity. In other words, talc powders were not 100% platy talc but contained levels of other co-occurring compounds such as talc containing asbestiform fibers (e.g., talc occurring in a fibrous habit), asbestos, nickel, chromium, and cobalt. These talc components are present in nature and are found in processed talcum powders. As a result, the purity of talcum powder products is an issue important to any safety assessment. It should be noted that talcum powder products manufactured decades ago were well known to contain asbestos as an impurity (EPA, 1992; IARC 2010). Contemporary cosmetic grade talcum powder products also have been shown to contain detectable levels of impurities that have included asbestos (Gordon *et al.* 2014). In 2009 and 2010, the FDA performed a survey where they examined 27 samples of cosmetic-grade raw talc and 34 talc-based products, including seven talc samples from Rio Tinto/Luzenac, one bottle of Shower to Shower, and one bottle of Johnson's Baby Powder, for the presence of asbestos.[17] FDA reported no detection of asbestos in the sample tested. However, as discussed by FDA: *"The results were limited, however, by the fact that only four talc suppliers submitted samples and by the number of products tested. For these reasons, while FDA finds these results informative, they do not prove that most or all talc or talc-containing cosmetic products currently marketed in the United States are likely to be free of asbestos contamination."* I considered these findings in light of the disclaimer, which acknowledge the limited sample size. As discussed in detail below, a review of internal company documents reveals that Imerys and Johnson & Johnson were aware that talcum powder products contained detectable levels of other toxic compounds that included but were not limited to fibrous talc, asbestos, chromium, nickel, and cobalt. There was one additional component of talcum powder products manufactured and sold by Johnson & Johnson, a fragrance component that contained many different chemicals (discussed below as well). Therefore, women using talcum powder products for genital dusting, or for application anywhere on the body, were exposed to a mixture of chemicals, not 100% pure platy talc. As a result, when performing a talcum powder product safety assessment, studies that describe talc products of varying purity levels were relevant to the assessment.

[17] http://www.fda.gov/Cosmetics/ProductsIngredients/Ingredients/ucm293184.htm

30. In the published medical literature, there is often discussion of talc using terms such as fibrous talc, asbestiform talc, non-asbestiform talc, or tremolite. Before discussing the literature on the toxicity of talcum powder products and its associated constituents it is useful to provide some background on the terminology of the mineral components of talcum powder products. As mentioned above, talc is one of a group of hydrous magnesium silicate minerals; its chemical formula is $Mg_3Si_4O_{10}(OH)_2$. Talc can occur as platy sheets of talc but also forms bundles of fibers (i.e., occur in an asbestiform habit), which consist of a group of individual elongate crystals. Asbestos is also a hydrous magnesium silicate mineral and has a chemical formula of $Mg_3Si_2O_5(OH)_4$. Like the term "talc", asbestos is the generic designation for a group of naturally occurring mineral silicate compounds that occur as fibers, either serpentine or amphibole fibers. The asbestos forms include the serpentine mineral chrysotile, and five amphibole minerals (actinolite, amosite, anthophyllite, crocidolite, and tremolite) (IARC, 2012). Chrysotile, lizardite, and antigorite are the three principal serpentine silicate minerals, but only chrysotile occurs in the asbestiform habit (USGS, 2001). In the amphibole series, amosite and crocidolite occur only in the asbestiform habit, while tremolite, actinolite and anthophyllite occur in both asbestiform and non-asbestiform habits. As discussed in older published literature, fibrous talc was often a term used to refer to any form of fiber in talc, including asbestos (Rohl *et al.* 1974). As a result, in this report, care was taken to use these terms when referring to the detection of fibers: asbestos, non-asbestiform talc (platy talc), and talc containing asbestiform fibers (fibrous talc).

31. Since talc occurs as a particle in nature, the biological effects of talc, including its adverse effects or toxic effects, are related to both its chemical composition and its physical structure. This is a general principle of toxicology that relates to tissue contact with chemical particles.[18] The biological effects and toxicology of talc have been reviewed (IARC, 1987; USEPA, 1992; IARC, 2010). The types of effects observed depend, in part, on the route of exposure. As a mineral, talc has the propensity to produce an irritant and inflammatory response at sites of exposure (reviewed in EPA, 1992; discussed in more detail below). It is the irritant and inflammatory properties of the mineral that the scientific literature indicates underlie many of the human health risks associated with talc exposure (as reviewed in IARC, 1987; EPA, 1992; IARC,

[18] http://ehs.unl.edu/documents/tox_exposure_guidelines.pdf

2010; discussed in more detail below). The presence of fibers in talc is important because exposure to fibers is known to cause adverse biological effects in cells and tissue. This is driven in part by the fact that the tissue response to a fiber as compared to a particle is affected by the ability of immune cells to engulf the fiber (Fubini and Fenoglio, 2007). If the fiber is long, immune cells cannot totally engulf the compound and remove the foreign material from the tissue. As a result, there are similarities in the potential adverse effects that are associated with any fibrous mineral, both talc and asbestos.

32. Given that talc used to manufacture body powders has the potential to be a mixture of toxic compounds, it is important to understand the constituents of commercially available talcum powder products manufactured and sold by Imerys and Johnson & Johnson. Johnson & Johnson was aware that asbestos or asbestiform fibers were present in talc that was mined for talcum powder products (*e.g.*, JNJ000251888). When commercially available talcum powder products have been analyzed, including powders sold by Johnson & Johnson, the data has shown that the powders contain variable levels of fibers, including fibers that were stated to be asbestos (*e.g.*, Paoletti *et al.* 1984; Blount, 1991; Mattenklott *et al.* 2007; Moon *et al.* 2011; Gordon *et al.* 2014; Anderson *et al.* 2017; Rohl *et al.* 1976; Pooley and Rowlands, 1975; Blejer and Arlon, 1973; Cralley, *et al.* 1968; Millman, N. 1947; JNJ000025132; IMERYS205540-554; IMERYS136824; IMERYS265938-993; IMERYS245144; JNJ000375389-390; IMERYS240376-378; IMERYS240406; IMERYS213431-433; JNJNL61_000052427; JNJNL61_000042576; IMERYS138505-511; IMERYS100130-150; JNJMX68_000004996-5031; JNJTALC000301172-1179; JNJ000264653-4655; JNJNL61_000033289-3292; JNJTALC000293589-591; JNJTALC000292656-657; IMERYS051370-374; IMERYS219720-722; JNJ000062359-363; JNJ000062436; JNJ000063951; JNJ000064544; JNJ000065264-266; JNJ000277941-943; JNJ000314315-316; JNJ000314406-414; JNJAZ55_000000905-948; JNJAZ55_000004563; JNJMX68_000003728; JNJMX68_000013019-020; JNJNL61_000079334; JNJMX68_000020276-282; JNJ000231304-318; IMERYS-MDL-AB_0006980; IMERYS 210136). In more recent work related to this litigation, scientists have found that samples of Johnson & Johnson body powder products that were examined contained

fibrous talc (see April 28, 2017 report by Longo and Rigler[19] where 8 of 11 samples contained fibers; August 2017 report by Longo and Rigler[20] where 14 of 30 samples contained fibers). Dr. Longo's testing of talcum powder samples produced in the MDL revealed that 37 of 56 samples contained asbestos and 41 of 42 observed to contain asbestiform talc. Although companies have claimed that talcum powder products manufactured after the mid-1970's were free of asbestos, asbestos fibers have been found in products in the marketplace after that time (*e.g.*, Paoletti *et al.* 1984; Blount, A.M. 1991; Mattenklott *et al.* 2007; Moon *et al.* 2011; Anderson *et al.* 2017; Egilman and Steffen, 2018; February 16, 2018 report of Longo and Rigler;[21] IMERYS095086-087; IMERYS136824; IMERYS245144; JNJ000375389-390; IMERYS213431-433; JNJNL61_000014431-14437; IMERYS219720-722). These published scientific studies, internal testing documents, and testing results by Longo and Rigler show that asbestos has been consistently present in Johnson & Johnson's talcum powder products since the mid-1950's and certainly after the 1970's when the defendants represented that asbestos had been eliminated from talcum powder products (additional support found within the exhibits and deposition testimony of Ms. Julie Pier, dated September 12, 2018; and Dr. John Hopkins, dated August 16 & 17, 2018; October 17, 2018, and November 5, 2018). The presence of asbestos was evident before the 1970's and after that time as well. It is important to note that talc containing asbestiform fibers was classified in 1986 as a known human carcinogen (IARC, 1987, 2010, 2012). Talc containing asbestiform fibers was listed by the State of California (PROP 65) in April 1990 as a chemical *"known to the State to cause cancer"*.[22] The National Institute for Occupational Safety and Health (NIOSH) has stated that there is no safe level of asbestos exposure (NIOSH, 1980). This means that human exposure to even very low levels of asbestos increase the risk of toxic effects including cancer.

33. With respect to asbestos as a constituent of talcum powder products, it had been known at least by the 1930's that asbestos exposure caused lung disease (*e.g.*, Cooke, W.E. 1927; Oliver, T. 1927; Seiler, H.E. 1928; Wood, W.B. 1929; Merewether and Price, 1930; Merewether,

[19] The report is entitled "Analysis Report: MAS Project # 14-1683 Johnson's Baby Powder Sample Set.
[20] The report is entitled "Analysis of Johnson & Johnson Baby Powder and Valiant Shower to Shower Products for Amphibole (Tremolite) Asbestos".
[21] The report is entitled "TEM Analysis of Historical 1978 Johnson's Baby Powder Sample for Amphibole Asbestos".
[22] https://oehha.ca.gov/media/downloads/crnr/p65list052518.pdf

E.R.A. 1930; Gloyne, S.R. 1935). As one author described the issue of asbestos exposure and lung disease, *"**widespread recognition of asbestosis** dates from the work of Merewether and Price in 1930 [**emphasis** added]"* (Hourihane and McCaughey, 1966). Additionally, it was known at least by the 1950's that asbestos exposure could cause lung cancer (*e.g.*, Gloyne, S.R. 1935; Doll, R. 1955; Selikoff *et al.* 1964). Additionally, ,some studies have reported an increased risk of ovarian cancer in women exposed to asbestos (*e.g.*, Keal *et al.* 1960; Graham and Graham, 1967; Newhouse *et al.* 1972; Acheson *et al.* 1982; Wignall and Fox, 1982; Newhouse *et al.* 1985; Tarchi *et al.* 1994; Bulbulyan *et al.* 1999; Germani *et al.* 1999; Magnani *et al.* 2008; Bunderson-Schelvan *et al.* 2011; Camargo *et al.* 2011; Wang *et al.* 2013; Ferrante *et al.* 2017). Regulatory authorities world-wide have identified asbestos as a known human carcinogen (*i.e.*, IARC, 1987; IARC, 2012; ATSDR, 2001; EPA, 1984; NTP, 2016; Canada[23]; European Union[24]; Australia[25]). Given the well-known toxic effects and human health risks associated with asbestos, the presence of asbestos fibers in talcum powder products is a significant risk to human health.

34. There is a fragrance component added to all Johnson & Johnson talcum powder products. In the document entitled *"Defendant Johnson & Johnson Consumer Inc.'s Supplemental Answer to Plaintiffs' Second Set of Interrogatories No. 19"* dated December 21, 2017, Johnson & Johnson provided a list of fragrance chemicals that are added to Johnson's Baby Powder® products and a list of chemicals that had been added to Johnson & Johnson's Shower-To-Shower® products. Over 50 fragrance chemicals were listed as having been added to the Shower-To-Shower products while more than 130 fragrance chemicals were listed as being currently used in Johnson's Baby Powder. This means that any bottle of talcum powder sold to consumers contained many different chemicals, not simply platy talc. It should be noted that recent changes to the Johnson & Johnson website provide disclosure to consumers of what is claimed to be "100%" of their fragrance ingredients.[26] The list on the website, however, is not the same as the list provided in the 2017 documents discussed above, and the website also fails to provide information on the fragrance chemicals used in the past. Both sources of information, the 2017 document produced by Johnson & Johnson and their updated website, fail to provide specific information on the amount of each

[23] https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/health-risks-asbestos.html
[24] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aem0032
[25] https://www.safeworkaustralia.gov.au/asbestos
[26] https://www.johnsonsbaby.com/our-mission/scents-fragrance

chemical component in the fragrance component of either Johnson's Baby Powder or Shower-To-Shower.

35. A review of the chemicals listed in the 2017 document reveals that, in many cases, the compounds listed are known to have toxic properties. In fact, of the fragrance chemicals listed, several have been associated with potential carcinogenic activity. These include ethenyl benzene, also known as styrene, and *p*-cresol (4-methylphenol). Styrene is a compound that has been classified by the National Toxicology Program (NTP) as "reasonably anticipated to be a human carcinogen"[27], and classified by IARC as a 2A carcinogen (probable human carcinogen)[28]. In the case of *p*-cresol, EPA has determined that it is "possibly carcinogenic to humans".[29] Other chemicals listed as being a part of the fragrance component of Johnson & Johnson talc body powders have been reviewed by IARC for cancer potential (coumarin, eugenol, d-limonene; all given a Category 3 classification of "not classifiable")[30]. A cancer risk, however, is not the only human health risk linked to the numerous fragrance chemicals present in Johnson & Johnson talc body powder products. Even a cursory search of the scientific information available on either non-governmental sites or regulatory authority sites[31] shows that most of the chemicals are known individually to have irritant properties and/or inflammatory properties when in contact with cells and tissues. Of the more than 100 chemicals included in the 2017 list of fragrance ingredients, over 70% are compounds that have been linked with some level of irritant hazard to tissues (skin, eye, mucous membranes; see Appendix D to this report; Report of Dr. Michael Crowley). The issue of irritant properties will be discussed below as it relates to carcinogenesis and mechanisms for cancer linked to talc and the chemical components of talc. Yet, consumers have never been provided with information that any of the ingredients in the Johnson & Johnson fragrance posed a potential human health risk.

[27] https://ntp.niehs.nih.gov/ntp/roc/content/profiles/styrene.pdf; https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=74
[28] https://monographs.iarc.fr/list-of-classifications-volumes/
[29] https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=196
[30] https://monographs.iarc.fr/wp-content/uploads/2018/06/ClassificationsAlphaOrder.pdf
[31] Searches of publicly available databases were performed including TOXNET, PUBCHEM, HSDB, The Good Scents Company (www.thegoodscentscompany.com), the Environmental Working Group (https://www.ewg.org/), cosmeticsinfo.org (PCPC sponsored site), and the Cosmetic Ingredient Review (https://www.cir-safety.org).

36. In addition to the presence of asbestos in talcum powder products and the presence of dozens of fragrance chemicals, evidence shows that the products manufactured by Imerys and sold by Johnson & Johnson contained detectable levels of heavy metals (*e.g.*, JNJ000245268-274; JNJMX68_000004996-5031; IMERYS223869-883; IMERYS265938-993; IMERYS194090-095; IMERYS032928; IMERYS094601; IMERYS053387-88; IMERYS098115-116; IMERYS219720-722; IMERYS304036; IMERYS-A_0015663; JNJ000265171; JNJTALC000869376; JNJ000025132; JNJ000347962-963; P-68; exhibits and deposition testimony of Ms. Julie Pier dated 9/12/2018; Cralley *et al.* 1968a; Pooley and Rowlands, 1975; Rohl *et al.* 1976; Gondal *et al.* 2012; Rehman *et al.* 2013). The levels of heavy metals have varied across different processed lots of talcum powders, but internal company documents show that certain heavy metals have been repeatedly detected, such as chromium (Cr), cobalt (Co), and nickel (Ni). These heavy metals are known to be toxic to human cells and tissues. Some of these heavy metals are known to be carcinogenic in animals and/or humans. Chromium (Cr) and nickel (Ni) have been classified as *"known human carcinogens"* by IARC[32]. Cobalt (Co) has been classified by IARC as Group 2B, or *"possibly carcinogenic to humans"*.[33] The NTP has listed chromium (Cr) and nickel (Ni) as *"known to be human carcinogens"*, while cobalt is listed as *"reasonably anticipated to be human carcinogens"*. [34]

37. Focusing now on talc itself as a toxic compound, a review of the scientific literature reveals that in many cases, the compound being tested or discussed is usually described simply as talc, with no description of the purity or physical state of the compound (fibrous or platy). In the following discussion of the literature that relates to the toxicity of talc, I will mention the specific type of talc (*i.e.*, mined talc, milled talc, fibrous talc, talc of certain purity levels, cosmetic grade talc, *etc.*), if reported.

38. A review of the published scientific literature shows that the human health hazards associated with exposure to talc dust has been known for decades, well before the 1970's. In fact, as far back as the first half of the 20th century (before 1950), scientists had discovered that:

[32] https://monographs.iarc.fr/wp-content/uploads/2018/06/ClassificationsAlphaOrder.pdf
[33] https://monographs.iarc.fr/wp-content/uploads/2018/06/ClassificationsAlphaOrder.pdf
[34] https://ntp.niehs.nih.gov/ntp/roc/content/listed_substances_508.pdf

- talc particles produced adverse tissue reactions in cells or tissues, and in humans and animals (*e.g.*, tremolite talc: Dreessen, W.C. 1933; Miller and Sayers, 1936; Greenburg, L. 1947; mining talc: Porro *et al.* 1942; Porro and Levine, 1946; Schepers and Durkan, 1955; industrial grade talc: Schulz and Williams, 1942; McLaughlin *et al.* 1949; Jaques and Benirschke, 1952; Sax, I. 1957; cosmetic grade talc: Roberts, 1947; Saxen and Tuovinen, 1947; Eiseman *et al.* 1947; U.S. Patent No. 2,621,333 filed June 27, 1947; Eberl *et al.* 1948; Graham and Jenkins, 1952; U.S. Patent No. 2,626,257 filed May 21, 1952 by Johnson & Johnson; Cless and Anger, 1954; Creery *et al.* 1957; Sax, I. 1957);
- exposure to talc dusts in an occupational setting was linked to an increased risk of lung disease, including cancer (*e.g.*, tremolite talc: Dreessen, W.C. 1933; Greenburg, L. 1947; mining talc: Dreessen and Dalla Valle, 1935; Porro *et al.* 1942; Porro and Levine, 1946; Kleinfeld *et al.* 1955; Schepers and Durkan, 1955; industrial grade talc: McLaughlin *et al.* 1949; Hogue and Mallette, 1949; Jaques and Benirschke, 1952; Mann and Deasy, 1954; Seeler *et al.* 1959; cosmetic grade talc: Millman, N. 1947);
- the risks associated with occupational exposures to talc were higher when fibrous forms of magnesium silicate minerals (talc as well as asbestos) were present (*e.g.*, Dreessen and Dalla Valle, 1935; Schulz and Williams, 1942; Saxen and Tuovinen, 1947; Millman, N. 1947; Greenburg, L. 1947; Hogue and Mallette, 1949; Schepers and Durkan, 1955); and
- exposure to cosmetic grade talcum powders themselves were associated with adverse tissue responses and adverse human health effects, including cancer in some cases (*e.g.*, Roberts, G.B. 1947; Greenburg, L. 1947; Eiseman *et al.* 1947; U.S. Patent 2,621,333; Eberl, 1948; Graham and Jenkins, 1952; U.S. Patent No. 2,626,257; Cless and Anger, 1954; Creery *et al.* 1957).

39. Then, when reviewing the scientific literature available since 1960, the evidence has continued to accumulate showing that:

- talc has adverse effects in cells, tissues, animals and humans (*e.g.*, cosmetic grade talc: Molnar *et al.* 1962; Blumel *et al.* 1962; Jenkins, M.Q. 1963; Tye *et al.* 1966; Trautwein and Helmboldt, 1967; Migaki and Garner, 1969; Merliss, R.R. 1971; Pott and Friedrichs, 1972; Wagner *et al.* 1975; Stenback and Rowland, 1978; Kaiser *et al.* 1982;

Davies *et al.* 1983; Hamilton *et al.* 1984; Stenback *et al.* 1986; Pelling and Evans, 1986; NTP, 1993; Hamilton *et al.* 2001; Buz'Zard and Lau, 2007; Shukla *et al*. 2009; Shim *et al.* 2015; Fletcher *et al.* 2018; Fletcher and Saed, 2018; mining or milling talc: Kleinfeld *et al.* 1963; Beck *et al.* 1987; unspecified: Henderson *et al.* 1971; Blejer and Arlon, 1973; Pott *et al.* 1974; Henderson *et al.* 1979; Abraham and McEuen, 1986);

- exposure to talc dusts in an occupational setting was linked to an increased risk of lung disease, including cancer (*e.g.*, mining or milling talc: Kleinfeld *et al.* 1963; Kleinfeld *et al.* 1964; Kleinfeld *et al.* 1967; Kleinfeld *et al.* 1973; Rubino *et al.* 1976: cosmetic grade talc: Miller *et al.* 1971; Nam and Gracey, 1972);
- the risks associated with occupational exposures were higher when fibrous forms of magnesium silicate minerals (talc as well as asbestos) were present (*e.g.*, Kleinfeld *et al.* 1963; Kleinfeld *et al.* 1964; Pott and Friedrichs, 1972; Blejer and Arlon, 1973; Pott *et al.* 1974; Wagner *et al.* 1975; Stanton *et al.* 1981), being linked to fibrotic diseases of the lungs, such as talcosis and pneumoconiosis (*e.g.*, Dreesen and Dalla Valle, 1935; Porro and Levine 1946; Greenburg, 1947; Kleinfeld et al. 1973); and
- exposure to cosmetic grade talcum powders themselves were associated with adverse tissue responses and adverse human health effects, including deaths in some cases (*e.g.*, Molnar *et al.* 1962; Blumel *et al.* 1962; Jenkins, M.Q. 1963; Hughes and Kalmer, 1966; Migaki and Garner, 1969; Moss, 1969; Miller *et al.* 1971; Nam and Gracey, 1972; Wagner *et al.* 1975; Brouillette and Weber, 1978; Mofenson *et al.* 1981; Cramer *et al.* 1982; Kaiser *et al.* 1982; Pelling and Evans, 1986; Kupryjanczyk, 1989; Buz'Zard and Lau, 2007; Shukla *et al.* 2009; Shim *et al.* 2015).

Also relevant to this discussion of what was known based on review of studies published in the scientific literature is the fact that Johnson & Johnson itself published a review article in 1976 (Hildick-Smith, 1976). In that paper, Dr. Hildick-Smith provided a summary of the scientific literature from the 1940's to the 1970's, listing many studies that provide proof that talc has toxic properties at certain doses and by different routes of exposure, *i.e.*, talc itself is a toxic compound.

40. Considered together, there is a large body of reliable scientific information, of all types (studies in cells, tissues, animals and humans), that identifies talcum powder products as

posing a hazard to human health. The types of toxicity produced are dependent on the route of exposure and the purity of the talc product. Yet, there is no controversy concerning the existence of a hazard and a need to control exposures to talc dusts and powders. Exposure to talc body powders internally (direct tissue contact) can cause a variety of adverse effects that are related to the known irritant and inflammatory properties of talc itself as well as the presence of other chemical components that exist in cosmetic grade talcum powder products.

## V. Talcum Powder Products: Perineal Application and Internal Exposure

41. The human health concern with talcum powder products in the current case is ovarian cancer in women who applied the products repeatedly to the perineal area. The first step to consider in the process of producing ovarian cancer with perineal talc dusting is exposure. Although dermal exposure is also a potential route of concern, the absorption of talc particles across skin has been assumed to not be of consequence when assessing toxicity of talcum powder products unless the skin has been damaged in some way. Instead, exposure assessments of talc applied dermally have focused on entry into the body through portals such as the lungs, the vagina or the mouth (IARC, 1987; EPA, 1992; IARC, 2010). The toxicity potential of talc has been shown to be affected by the route of exposure, with more significant toxicity linked to penetration of small talc particles into tissues and triggering of cytotoxic responses at the local site of tissue interactions (EPA, 1992). Therefore, consistent with existing data, talc would be less toxic following oral exposure where the interaction with stomach acids, and presence of the gastrointestinal barrier, would affect the expected toxicity potential.

42. When assessing the potential for human exposure to talc applied to the perineal area, the focus has been on entry into the body through the vagina. There also is evidence that application of talcum powder products results in inhalation exposure of talc dusts (*e.g.*, the September 2017 study by Longo and colleagues entitled "*Below the Waist Application of Johnson & Johnson Baby Powder"*; Jasuja *et al.* 2017; Frank and Jorge, 2011; van Huisstede *et al.* 2010; Wells *et al.* 1979). An early study by the National Institute of Occupational Safety and Health (NIOSH) in 1972 showed that talcum powder products samples available commercially contained fibers and that exposure to fibers would occur during diapering (JNJ000231304-318); this study was received by Johnson and Johnson at least by March of 1974. Based on its chemical nature,

talc delivered as a powder in consumer products can be inhaled while being applied (EPA, 1992; IARC, 2010). Regardless of the portal of entry, lungs versus the vagina, talc-induced local tissue toxicity would be expected to be produced in tissues that are accessed following perineal dusting with talc. With respect to inhalation exposure of talcum powder products and the potential for inhaled particles to migrate to the ovaries, studies have shown that asbestos fibers can move from the lung to other body organs via the lymphatic system (Suzuki and Kohyama, 1991; Bunderson-Schelvan et al. 2011). The lymphatic system is known to be involved in the transport of inhaled particles from the lung to distant sites (Leak, L.V. 1980; Stuart, B.O. 1984; Adamson and Prieditis, 1998; JNJ000046293). Thus, it is biologically plausible that talc particles that embed or deposit within lung tissue could be transported away from the lungs through the lymphatic system in the same way that other particles, and even asbestos, have been shown to travel to sites distant from their portal of entry, the lungs. With respect to genital dusting of talcum powder products, I considered the available evidence related to the ability of talc to migrate from the site of application, *i.e.*, perineal or vaginal application, to the ovaries.

43. The migration of talc internally after perineal application was discussed by scientific and regulatory bodies that reviewed the toxicokinetics of talc (EPA, 1992; IARC, 2010) as well as by FDA in a recent letter (FDA, 2014). As FDA concluded in 2014, *"…**the potential for particulates to migrate from the perineum and vagina to the peritoneal cavity is indisputable**. It is, therefore, plausible that perineal talc (and other particulate) that reaches the endometrial cavity, Fallopian Tubes, ovaries and peritoneum may elicit a foreign body type reaction and inflammatory response that, in some exposed women, may progress to epithelial cancers." [**emphasis** added]*. A review of the scientific literature revealed that FDA's conclusion is supported by a variety of studies that include, but are not limited to, studies examining or reviewing the migration of particles in humans (*i.e.*, Egli and Newton, 1961; de Boer, 1972; Parmley and Woodruff, 1974; Venter and Iturrulde, 1979; Blumenkrantz *et al.* 1980; Gardner *et al.* 1981; Iturralde and Venter, 1981; Holme *et al.* 1984; McCalley *et al.* 1985; Wright *et al.* 1996; Kunz *et al.* 1996; Heller *et al.* 1996; Kunz *et al.* 1997; Kadanali *et al.* 2001; Kunz and Leydendecker, 2001; Kissler *et al.* 2004; Sjosten *et al.* 2004; Kunz *et al.* 2007; Zervomanolakis *et al.* 2007). Additionally, authors have described the potential for abdominal exposure to talc particles following perineal application of talcum powder products in women (Longo and Young, 1979);

the abdominal cavity in humans is reached directly through migration of particles from the vagina, through the reproductive tract and up towards the ovaries, which are suspended within the peritoneal space. These studies are important because they demonstrate that inert particles routinely move from the lower female reproductive tract (vagina) up into fallopian tubes and towards the ovaries. There also are data demonstrating the presence of talc particles in the ovaries of women who had reported use of talcum powder products on the genital area (*e.g.*, Heller *et al.* 1996; Cramer *et al.* 2007), as well as animal studies showing that in some species talc can migrate from the lower to the upper genital tract (*e.g.*, Phillips *et al.* 1978; Gardner *et al.* 1981; Henderson *et al.* 1986; Edelstam *et al.* 1997). Given the differences between animals and humans in terms of anatomy of the genital tract, the studies in humans are the most reliable in terms of human health risk assessment and the toxicokinetics of talc applied externally to the perineal area. The weight-of-the-evidence shows that inert particles routinely move from the lower female reproductive tract (vagina) up into the uterus, the fallopian tubes and towards the ovaries. Therefore, in terms of the potential for exposure following perineal application of talc body powders, the available data support statements by the FDA that particulates can move from the vagina up the reproductive tract in women to provide for exposure to internal organs, including the ovaries.

44. An early study examining the issue of migration of substances through the female reproductive tract was undertaken to better understand the time relationships and precise mechanisms of transport of inert particles or spermatozoa in humans (Egli and Newton, 1961). The study was designed to determine whether, under reasonably controlled conditions, carbon particles could be transported quickly from the vagina to the fallopian tubes. Three women who were scheduled for hysterectomy voluntarily participated and were administered carbon particles under anesthesia after being positioned on their backs. Three to four milliliters of sterile carbon particles in a Dextran suspension were deposited in the upper portion of the vagina. Oxytocin was administered intra-muscularly at that time as well. Immediately after injection, the fallopian tubes were removed and examined for the presence of carbon particles; a very short time was allowed for potential transport. In two of the three women, carbon particles were recovered from the fallopian tubes 28 and 34 minutes after injection into the vagina. The authors concluded: "*These data, together with other work in animals and humans, support the belief that the motility of spermatozoa is not the chief factor in sperm transport.* ***Contractions of the muscle of the uterus***

***or other reproductive organs may be very important****, and it is possible that oxytocin may play a part in this process."[**emphasis** added]* A similar study was performed a decade later (DeBoer, 1972) where the author reported on the movement of carbon material up the genital tract in a series of patients undergoing abdominal surgical procedures. The women were injected (some cervical instillations and some uterine instillations) with a colloidal carbon suspension (India ink), and in some cases women also were given an injection of oxytocin. Surgeries were performed at various times after injection, from 15 minutes l to 24 hours after injection. The authors stated *"…**there was no doubt that the inert carbon material was frequently and rapidly transported from the uterus to the tubes** in both phases of the menstrual cycle." [**emphasis** added]* Passage of particles from the vagina to the uterus was observed in two of 37 patients examined, while particles were detected in the fallopian tubes in 30% of patients with cervical instillation and in 50% of patients with uterine instillation. Two years later, the migration of environmental substances externally in women was discussed in connection with the origins of ovarian mesotheliomas (Parmley and Woodruff, 1974). In the discussion section the authors stated: *"The uniqueness of the female peritoneal cavity is that **environmental substances may more easily reach it by passage through the vagina and Fallopian tubes** (Fig. 13). Conversely, no such entry is available in the male…" [**emphasis** added]* All three of these studies provided early notice of the ability of particles to move up the female reproductive tract.

45. In addition to studies in humans, experiments were conducted in different animal species to examine the ability of talc to be distributed beyond the site of exposure, oral or intra-vaginal application (Phillips *et al.* 1978). As discussed by the authors, their studies were prompted by the safety concerns raised in the scientific literature with respect to talc, specifically they indicate that *"the possibility of a causal relationship between particular types of tumours and the presence of talc has caused disquiet about its safety-in-use"*. With respect to the issue of movement of talc within the reproductive tract, rabbits were administered either a single intra-vaginal dose (50 mg total talc in 0.5 ml volume; three rabbits tested) or six daily doses of the same amount of talc (also 3 rabbits). In all cases, the animals were sacrificed 72 hours after the dosing ceased. The urogenital tracts were dissected to determine if radioactivity could be detected. After one dose of radiolabeled talc, radioactivity was detected only in the vagina. In the rabbits administered multiple doses of radiolabeled talc, radioactivity was detected at the site of application but also in the cervix,

the uterus and the fallopian tubes, but not the ovaries. Thus, migration or translocation occurred in the rabbit reproductive tract to a limited extent, although not all the way to the ovaries. Even though studies in animals are not ideal in terms of modeling the female reproductive tract, this study again provided notice of the ability of particles to move within the reproductive tract.

46. In another human study in 1979, scientists reported use of a radionuclide procedure designed to evaluate the migration of a particulate radioactive tracer from the vagina to the peritoneal cavity and ovaries, as well as the determination of the patency of the pathways between these two extremes of the female reproductive system (Venter and Iturralde, 1979). The procedure employed radiolabeled human albumin microspheres that were deposited into the vaginas of 24 patients one day before they were to undergo a gynecological surgery. Sequential images were obtained during the 24-hour period, and after the surgeries were completed radioactivity levels in the removed organs and tissues were counted with a scintillation detector. The authors reported that in 14 out of 21 cases it was possible to measure radioactivity levels in the adnexa (*i.e.*, fallopian tubes, ovaries) separately from the uterus. Nine patients showed marked radioactivity in the tubes and ovaries, while in five patients the radioactivity levels were not much higher than the background. In all five of these patients with background levels of radioactivity detected, the authors reported that severe tubal occlusion was confirmed. As the authors discussed: *"**Evidence is available for migration of different substances in either direction within the female reproductive system** between the peritoneal cavity and ovaries via the tubes, uterus and vagina, and the outside. Various living organisms actively follow this pathway in both directions. Gases, fluids, dyes and contrast media can easily be introduced from the vagina into the peritoneal cavity. **If transit can take place so easily, it is probably the same for many chemical substances used for hygienic, cosmetic or medicinal purposes, many of which may have potential carcinogenic or irritating properties**." [**emphasis** added]* This paper provided evidence that migration of talc upwards into the female reproductive tract was considered more than a possibility at this point in time.

47. In a similar study reported in 1985 (McCalley *et al.* 1985), scientists performed a prospective study to evaluate the efficacy of radionuclide hysterosalpingography (RNHSG) using a technique with some modification that had been described by Venter and Iturralde (1979). The

authors state: *"As these investigators demonstrated, technetium labeled human albumin microspheres will* ***normally migrate spontaneously from the vagina to the ovaries****." [****emphasis*** *added]* This new study confirmed the findings of the 1979 study and showed that if the fallopian tubes are not patent, migration cannot continue. Most importantly, the authors provided the following conclusions: *"Our work confirms the observation of Iturralde and Venter that inert particles are easily and spontaneously transported from the vagina through the genital tract to the ovaries. This implies that sperm motility, although possibly essential, e.g., for penetration of the ovum, may not be the basic factor in sperm transport.* ***It also confirms that pathogenic materials deposited in the vagina can be transported onto the ovary and may play a role in the etiology of some ovarian carcinomas.*** *[emphasis added]* The scientific studies providing notice on the ability of particles to migrate continued to build.

48. Another source of human data related to migration of substances upwards in the female reproductive tract is found in a book chapter that was prepared from a presentation made at the 7th International Symposium on Controlled release of Bioactive Materials (July 27-30, 1980) (Gardner *et al.* 1981). The chapter provides an overview of what was known at the time regarding movement of particles and other materials up the female reproductive tract from the vagina. The chapter was focused on using that route of exposure as a method for delivery of drugs in women. The author stated: *"The concept of a particulate drug-delivery system is further supported by studies in humans, which* ***demonstrate the movement of inert particles through the reproductive tract****. Following placement in either the vagina, cervix, or uterus, particles such as carmine or carbon black have been observed to* ***migrate into the fallopian tubes or peritoneal cavity****." [****emphasis*** *added]* Additionally, the authors described new studies in Stumptail monkeys. They reported that vaginally delivered drug particles were able to migrate through the cervix into the uterus. They stated: *"Transcervical migration from the vagina to the uterus (24 hours post-insertion) was observed to some degree in six out of eleven animals. In these studies, it appeared that capsule diameters less than 300 microns in diameter showed preferential migration. However, one animal out of three at the largest capsule diameter did show migration of greater than three percent of the inserted microcapsules."* In a study in one baboon, the authors reported that six hours after insertion of two different sizes of tracer microcapsules there was essentially no difference in transcervical migration between the two sizes, and that migration was rapid (within

six hours) into the cervix, uterus, and fallopian tubes. These studies provided additional evidence for migration of substances from the vagina upwards into the reproductive tract, including a study in primates.

49. Three additional animal studies appeared in the scientific literature in 1985 and 1986 that are relevant to the issue of talc migration in the female reproductive tract (Wehner *et al.* 1985; Henderson *et al.* 1986; Wehner *et al.* 1986). Henderson and colleagues from the Tenovus Institute reported on the ability of talc to migrate from the vagina to the ovary in rats (Henderson *et al.* 1986); this same research group had published data on the finding of talc in the human ovary (Henderson *et al.* 1971; Henderson *et al.* 1979). The authors stated: "***Direct communication between the external environment and the peritoneal cavity*** *exists in the female via her genital tract." [**emphasis** added]* The study was undertaken after Henderson and colleagues (1984) showed that injection of talc beneath the bursal sac around the ovary in rats was accompanied by *"associated epithelial changes not inconsistent with the histological picture of premalignancy."* In the first of this new set of experiments by Henderson and colleagues in 1986, eight rats received intra-uterine talc (100 mg/ml suspension; 250 µl volume) injections. Rats in Group I (four rats) were sacrificed five days after talc exposure, and their ovaries were removed. Rats in Group II (four rats) received further talc uterine injections six days or 15 days after initial treatment. On day 20, two rats were sacrificed, and the remaining two rats were sacrificed 22 or 30 days after initial treatment. In all cases, ovaries were removed and analyzed for the presence of talc particles. In a second experiment employing vaginal delivery of talc, twelve rats were divided into two groups of six. Rats in Group I had a 250 µl suspension of talc (100 mg/ml) deposited into their vagina, while rats in Group II received vehicle treatment. Two animals in each group were sacrificed 24 hours, 48 hours and four days after treatment. Their ovaries were removed and processed for detection of talc particles. Particles of talc were identified in the ovaries of all rats at all time points where talc had been instilled into the uterus. With vaginal instillation, talc particles were detected in two of the animals when sacrificed after four days.

50. In the two studies published in 1985 and 1986, Wehner and colleagues (Wehner *et al.* 1985; Wehner *et al.* 1986) investigated the translocation of talc in animals. As noted in the

studies, these were commissioned and funded by PCPC.[35] At the time these studies were conducted, Dr. Wehner was also a consultant with Johnson & Johnson. Wehner *et al.* (1985) first examined the ability of bone black particles to translocate from the vagina upwards into the oviducts in monkeys. Five monkeys were instilled with 0.3 ml of a 4% bone black suspension in the posterior fornix during their mid-menstrual cycle, followed by injection of oxytocin intra-muscularly. Animals were sacrificed either one hour (n=3) or 72 hours (n=2) after vaginal instillation was performed. The authors stated that they did not believe any translocation had occurred but could not rule it out with certainty. Thus, two additional monkeys were administered radiolabeled talc in a pilot study (single doses of talc) and the animals were sacrificed after 72 hours. Again, the authors reported no translocation occurred in the animals. In a follow-up study, Wehner *et al.* (1986) again examined talc migration in monkeys. Unlike the monkey studies of Gardner *et al.* (1981) and the studies in rats and rabbits discussed above, this was the only animal study published up to this time where the authors reported no translocation of talc to the oviducts. Six monkeys were used by Wehner and colleagues in this *in vivo* study where low doses of radiolabeled talc (125 mg) were instilled into the vagina of the monkeys under sedation, 30 times over 45 days. In three of six monkeys tested, there was no talc found and the investigators believed it may have been due to menstrual flow that had occurred in the monkeys at different times during the experiment. The authors also stated that their results differed from those of an earlier group (Gardner *et al.* 1981) and suggested the differences may have been due to use of much lower doses of talc, different materials, and longer sedation times. The data by this group were inconsistent with other animal data but most importantly they were inconsistent with the human data which is the most relevant data in terms of the issue of movement of particles in women.

51. By the 1990's the issue of migration of substances upwards in the female reproductive tract was discussed in the medical literature in review articles, indicative of the general acceptance in the scientific community of the ability of particles to migrate up the female reproductive tract. In one review (Wright *et al.* 1996), the authors began by stating: "*Dusting powders are used…**These powders can gain access to the abdominal cavity through the vagina** and during surgery, and they have caused numerous complications that have serious, life-threatening consequences." [**emphasis** added]* In the discussion section of this paper the authors

[35] The PCPC was known at the time as the CTFA (see footnote on page 329 of Wehner *et al.* (1986)).

pointed out that the known toxicity of talc in human tissue and *"the ability of the female genital tract to transport particles to the abdominal cavity"* should lead to physicians discouraging their patients to use talcum powder in the perineal area or when dusting diaphragms.

52. In a 1996 article, scientists directly addressed the issue of perineal talc usage and ovarian talc particle burden (Heller *et al.* 1996). The scientists examined ovarian tissue from 24 women undergoing ovary removal; the patients were interviewed regarding talc usage. Twelve women reported frequent perineal talc applications, while twelve reported no use, although diapering history was not available in all women (the authors considered baby powder use during diapering as a potential source of talc powder exposure in the past). The authors conclusions were stated in their abstract as follows: *"The detection of talc in all ovaries demonstrates that it can reach the upper genital tract. Widespread exposure to talc during diapering may contribute to the ubiquitous presence of talc in ovarian tissue."* This paper has been criticized based on the issue of potential laboratory contamination that could have contributed to the results, as well as the fact that women reporting no perineal use had talc detected in ovarian tissue. Regardless of these limitations, however, the results showing higher overall particles counts in women reporting perineal application of talc are nevertheless consistent with the ability of talc particles to migrate up the female reproductive tract. More importantly, this study is but a small piece of the overall evidence that supports the ability of talc to migrate from the vagina to the ovaries.

53. In a series of studies conducted in the 1990's and into the 2000's, Dr. Kunz reported on the importance of the uterine peristaltic pump to the ability of sperm to be rapidly transported through the female reproductive tract (Kunz *et al.* 1996; Kunz *et al.* 1997; Kunz and Leyendecker, 2002; Kunz *et al.* 2007). In the initial studies, Kunz and colleagues (Kunz *et al.* 1996) used hysterosalpingoscintigraphy as a tool to examine transport of particles up the reproductive tract in women. Technetium-labelled albumin spheres from 5 to 40 microns (a size similar to talc particles found in body powders) were instilled at the posterior vaginal fornix (upper vaginal area) and the path of the spheres was followed. The authors reported immediate movement of the spheres up the tract, with spheres detected in the fallopian tubes within minutes. The movement was greatest during the follicular phase of a woman's cycle. The authors stated: *"Furthermore, our studies with inert particles suggest that this directed ascension is not a property of the spermatozoa and is thus*

*not provided by mechanisms such as chemotaxis,* ***but rather constitutes a specific utero-tubal function controlled by the dominant follicle in that the uterine myometrium with its specific architecture (Goerttler, 1930) is activated and contracts in a manner providing this directed transport****." [****emphasis*** *added]* In other words, the motility of the sperm was not needed for transport to occur. In a 2007 study (Kunz *et al.* 2007), Dr. Kunz used methods similar to ones employed in his 1996 study. He again showed that technetium-labelled albumin spheres from 5 to 40 microns (a size similar to talc particles found in body powders) that had been instilled into the vagina were transported up the female genital tract, both with and without oxytocin use. The paper describes the now well-established ability of small particles to migrate upwards, with greatest movement occurring during the follicular phase of a woman's cycle (see reviews of the role of the uterine peristaltic pump, *e.g.*, Kunz *et al.* 1997; Kunz and Leyendecker, 2002; Zervomanolakis *et al.* 2007).

54. Two additional studies were identified in the scientific literature that related to particle migration in women (Kadanali *et al.* 2001; Sjosten *et al.* 2004). Kadanali and colleagues (2001) discussed upwards transport in the genital tract in women. Although the focus of their paper was on movement of sperm in women with IUD devices in place, one group of women were treated by intra-vaginal instillation of albumin microspheres (referencing use of the method of Iturralde and Venter) instead of sperm. The microspheres were from 10 to 90 microns in size (also in the size range of talc particles found in body powders). The authors reported that while active sperm migration was greatly inhibited (9 of 14 subjects, 65%) in the presence of an IUD, passive transport of the particles was not affected (10 of 10 subjects, 100%) in IUD-bearing women. These data provided additional support for the migration of particles upwards into the fallopian tubes of women, even women with an IUD device implanted. With respect to powder migration specifically, Sjösten and colleagues (2004) reported results of a study in humans to confirm migration that had been observed in an animal model. In the study, one group of women (n=12) underwent a gynecological exam with powdered gloves the day before an abdominal hysterectomy and another group was examined with powdered gloves four days before surgery (n=12). Two control groups were examined with powder-free gloves (n=12 or n=14). Cell smears were taken from the peritoneal fluid and during the operation further smears were taken from the fallopian tubes, uterine cavity and cervical canal. The authors reported that retrograde migration of starch

particles had occurred in humans after examination with powdered gloves. The authors concluded: *"Consequently, powder or any other potentially harmful substance that can migrate from the vagina should be avoided."*

55. Considered together, these studies conducted in both humans and in animals demonstrate the ability of particles to be transported upwards against gravity in the female reproductive tract. These studies provide support for the FDA statement in 2014 that the potential for particulates to migrate from the perineum and vagina to the peritoneal cavity "*is indisputable*". More importantly, studies going as far back as the 1960's provided direct evidence for the potential of particles to migrate from the vagina to the ovaries in humans. At least in 2004, Imerys was acknowledging that "*compelling evidence*" for migration had been published (IMERYS288328-330).

56. Before leaving this discussion of talc migration, it is important to point out that in its review of the issue of talc migration in the genital tract of women, the CIR panel mentions many of the same studies described above; however, there is no mention of eight additional human studies and reviews of the issue (*i.e.*, Parmley and Woodruff, 1974; McCalley *et al.* 1985; Wright *et al.* 1996; Kunz *et al.* 1996; Kunz *et al.* 1997, Kadanali *et al.* 2001; Kunz and Leyendecker, 2002; Kunz *et al.* 2007). All eight of these papers were available by the time of the CIR review. Therefore, it appears the CIR panel failed to account for all the studies that informed on the issue of migration of particles, such as talc, upwards through the reproductive tract. This omission is particularly important given the fact that the CIR panel stated the following with respect to the epidemiological studies and how that data was considered:

> *"The Panel stated that causation would depend on the migration of talc from the perineum to the ovaries. There is no conclusive explanation for the presence of talc in the ovaries reported in some studies. However, the Panel agreed that there is no known physiological mechanism by which talc can plausibly migrate from the perineum to the ovaries." [see page 23 of the CIR Final Report dated April 12, 2013]*

The CIR process (discussed in detail below) was limited by the omission of a series of human studies and review papers directly relevant to the issue of talc particle migration. As a result, I

agree with the FDA's conclusions on this issue and assign little weight to the conclusions reached by the CIR panel concerning talc migration.

## VI. Talc and Cancer

57. In this case, the toxicity of concern for talcum powder products exposure in humans is cancer. The specific risk issue for this case is exposure to powdered talc products through perineal or genital application, as well as inhalation exposure, leading to migration of talc internally, resulting in ovarian cancer. The issue of talc and cancer risk in humans has been recognized for decades (see papers discussed in reviews such as EPA, 1992; IARC, 2010). Although ovarian cancer is the focus of the current case, other forms of cancer have also been linked to talc exposure (*i.e.*, lung cancer with inhalation exposure to talc; IARC, 2010) To determine whether there is a reasonable basis to conclude there may be a health hazard associated with talcum powder products, it is important to review the totality of the evidence to determine whether there is scientific support. Therefore, I have considered available *in vitro* and *in vivo* toxicology data, mechanistic data, epidemiological studies, and other evidence. In reviewing the evidence, I employed the methodology as discussed earlier in my report (see paragraphs 6, 11, 12, and 13).

58. There is a body of mechanistic data that also needs to be considered when looking at the issue of talcum powder products and risks to human health. It is important to remember that administration of even a single dose of talc in animals has been shown to produce adverse effects locally, at the site of exposure, that have included granulomatous reactions, cellular proliferation, and adhesions (as reviewed by EPA, 1992). Thus, evidence shows that talc exposure induces local tissue responses that are adverse effects, not simple adaptive effects, and those effects lead to tissue damage.

59. Talc can induce toxicity in tissues and cells through direct contact. The studies discussed above related to the ability of talc to migrate from the vagina upwards in the reproductive tract in women are important evidence that talc can arrive at sites where local tissue toxicity would be produced, such as the fallopian tubes and the ovaries. Studies looking at local tissue effects of talc would be important when examining a mechanistic basis for talc carcinogenicity in humans.

Starting in the 1980's, studies appeared in the scientific literature related to understanding the local tissue effects of talc. In an early study, the cytotoxicity of seven different respirable talc products (expected to be of high purity) provided to researchers by the PCPC were studied (Davies *et al.* 1983). Specifically, the fibrogenic potential of talc was investigated through use of a cell bioassay (macrophage toxicity) using murine peritoneal macrophages. All seven talc samples tested were found to be cytotoxic and the authors stated they *"would be expected to be fibrogenic in vivo"*. In another study (Hamilton *et al.* 1984), direct exposure to what was claimed to be asbestos-free talc (via single intra-bursal injection) on the surface of the ovaries of rats was associated with adverse effects including *"focal areas of papillary change"* on the surface epithelium of the ovaries, often discussed as pre-neoplastic lesions; thus, talc was toxic to ovarian tissue in mammals. Beck and colleagues (1987) examined the local tissue toxicity of talc dust (stated to be asbestos-free and granite-free dust), as well as other mineral dusts,[36] *in vivo* in animals (hamsters) following a single intra-tracheal instillation of a dust into lung tissue. The experiments examined the dose-response relationship (0.15, 0.75 and 3.75 mg talc/100 g body weight) and the time course (1 to 14 days post-exposure) of the effects of dust exposure in lung tissue. The authors stated: *"One day after exposure, both talc and granite dust resulted in elevated enzyme levels and pulmonary cell numbers in BAL [bronchial alveolar lavage fluid]. Macrophage phagocytosis was also inhibited. Based on results from earlier studies, response levels were either intermediate between nontoxic iron oxide and toxic a-quartz or comparable with n-quartz. The response to granite dust diminished fairly rapidly over time. By contrast, after talc exposure, there was a more persistent elevation in enzyme levels, and macrophage phagocytosis remained depressed. These results indicate that when a similar mass was deposited in the lungs,* ***talc caused more lung injury than did granite****." [****emphasis*** *added]* In another study (Radic *et al.* 1988), talc was shown to suppress immune system function in rats injected subcutaneously with talc. Talc induced granulomatous reactions in the animals, and spleen cells from talc-treated rats suppressed the immune response. Each of these studies provided evidence that talc is toxic to cells and tissues that are contacted with talc dusts/particles, including ovarian tissue.

60. In 1993, the results of chronic GLP-quality studies conducted from 1984-1986 in rats and mice were reported (NTP, 1993; P-0832 was the draft report). In these studies, using

[36] Granite dust was tested in this study as well.

standard study methods of the time, the potential for talc (stated to be asbestos-free) to produce cancer following inhalation was studied. The study rationale was stated as follows: *"Talc was nominated by NIOSH in 1978 for testing by NTP because of the paucity of adequate information on its carcinogenicity and because of widespread human exposure. The inhalation route was chosen because it is the most common route for human exposure."* Although earlier studies had investigated the cancer potential of talc (see review in IARC, 1987), limitations in study design affected their utility for human health risk assessment (*i.e.*, less than lifetime exposures, small group sizes, *etc.*). An important feature of this study was the interim sacrifices performed in both rats and mice in all three exposure groups of both sexes (see Table 5 and Table 11 of NTP, 1993). This meant that the evolution of lung lesions was examined in the animals, allowing for identification of a potential mechanism for lesions that developed in lung tissue. The study authors concluded:

> *"Under the conditions of these inhalation studies, there was some evidence of carcinogenic activity of talc in male F344/N rats based on an increased incidence of benign or malignant pheochromocytomas of the adrenal gland. There was clear evidence of carcinogenic activity of talc in female F344/N rats based on increased incidences of alveolar bronchiolar adenomas and carcinomas of the lung and benign or malignant pheochromocytomas of the adrenal gland."*

This information alone is significant for human health risk assessment; however, the findings from the interim sacrifices in both rats and mice were extremely useful in terms of identifying a mechanism for lung tumors in rats and mice. The text from the study is quoted below as it provides important support for a mechanism for talc-induced carcinogenesis.

> *"Although the inflammatory response was basically similar in rats and mice, there were important species differences. The lesions in rats were generally more extensive and more severe than those in mice at similar exposure concentrations. In rats, foreign body giant cells were occasionally observed and some of the alveolar macrophages developed the morphological characteristics of epithelioid macrophages. More importantly, the* ***inflammatory lesions in rats were accompanied by interstitial fibrosis, hyperplasia of alveolar type I1 epithelial cells, and, infrequently, squamous metaplasia of the alveolar epithelium****." [****emphasis*** *added; see page 51 of NTP 1993]*

> *"A **potential mechanism** for the development of pulmonary neoplasms associated with insoluble particulate substances is that **the prolonged stimulus for cell replication, due not only to cell injury but to the release of mitogenic growth factors from alveolar macrophages, provides a favorable environment for the promotion and progression of spontaneously initiated cells.** The interim evaluations in the NTP talc study clearly demonstrate **a progressive impairment of homeostatic growth regulation in the areas of chronic inflammation and fibrosis associated with talc deposition in rats**. Hyperplasia of the alveolar epithelium was evident at 6 months and became more extensive and severe with duration of exposure. Not only were there increased numbers of cells (hyperplasia), but some cells assumed morphologic features atypical of regenerating or differentiated type I1 cells (epithelial dysplasia). The altered or dysplastic epithelium was particularly evident in areas of fibrosis. The squamous metaplasia observed in female rats also represents altered differentiation of populations of alveolar epithelial cells and is notable in light of the development of squamous cysts and squamous cell carcinomas." [**emphasis** added; see pages 54-55 of NTP, 1993]*

Thus, these data from interim sacrifices in rats and mice provided an important signal for human safety. The 1993 NTP study has been criticized and conclusions reached by the original authors have been questioned (*i.e.*, Carr, 1995; CIR, 2013). Yet, even with its limitations, the study provides important information on talc toxicity that is relevant to assessing the risks of cancer in humans. In fact, scientists that initially reviewed the study supported the use of the data for listing of talc in NTP's Report on Carcinogens (RoC; discussed in more detail below). It also should be noted that based on an inhalation route of exposure in rats and mice that was employed in the studies (NTP, 1993), the studies would not be expected to produce ovarian tumors in rats or mice given the route of exposure that would severely limit any perineal exposure to talc. Moreover, unlike humans, the ovaries of rats and mice are completely covered by a bursal sac, making direct access to ovarian tissue unlikely when exposure is assumed to be due to vaginal penetration and migration to the ovaries.

61. In more recent studies, the biologic basis of effects in cells and tissues associated with exposure to talc that could be linked to carcinogenesis were evaluated. In one study, (Buz'Zard and Lau, 2007) normal ovarian cells in culture were treated with increasing concentrations of talc in solution, either with or without the presence of a chemotherapeutic agent that has been shown to have anti-cancer activity (*i.e.*, inhibits oxidative damage in cells, induces apoptosis of cancer cells). The authors reported that talc treatment increased generation of reactive oxygen species in ovarian cells and induced neoplastic transformation. In another study looking at cellular changes associated with mineral exposure, Shukla and colleagues (2009) examined mineral pathogenicity of four different particles, including asbestos and non-fibrous talc. Human lung mesothelial cells and human ovarian epithelial cells in culture were employed. Both types of cells were exposed to increasing concentrations of asbestos, talc, titanium oxide and glass beads. The asbestos was identified as crocidolite asbestos with a mean size of 7.4 μm and had greater than 3:1 length to width ratio. The talc was stated to have a mean size of 1.1 μm and was stated to occur as *"platy particles that were uniform in appearance"* (by field emission scanning electron microscopy). The results of most interest in terms of mechanism of action that relates to the potential to produce a carcinogenic response in tissue included the cell viability data and the changes in gene expression induced by exposure to asbestos and talc. As expected, asbestos fibers were toxic to human cells, both lung and ovarian cells; asbestos is a known human carcinogen. The authors reported that the lung cells were more sensitive to the toxic effects of asbestos; however, testing of only two doses of asbestos limit the conclusions that can be drawn about differences between cells. In the case of talc, lung cell viability was decreased in a dose-dependent manner; decreased viability was reported at talc doses of 15 and 20 $\mu g/m^2$. When two lower doses of talc, 1 and 5 $\mu g/m^2$, were tested in ovarian cells, there was no effect on cell viability. Gene expression changes in lung mesothelial cells also were examined, and exposure to asbestos for up to 24 hours was associated with significant effects on gene expression. The authors reported that fewer gene expression changes occurred in ovarian cells exposed to asbestos. They also reported that fewer gene expression changes were observed in lung cells following exposure to talc at a dose of less than 5 $\mu g/m^2$ for up to 8 hours, and no significant changes in ovarian cell gene expression were observed with talc exposure. However, when the list of genes whose expression was affected by asbestos and talc was examined, it is seen that some of the genes affected are involved in cellular processes that relate to oxidative stress and inflammation. The authors of this

study failed to test talc with the same rigor that asbestos was tested in their study, limiting the data collected on talc itself. Nevertheless, the study did reveal statistically significant increases in *ATF3* and IL8 expression by asbestos and non-fibrous talc at certain concentrations. The data collected with asbestos exposure supports known toxicity of induction of oxidative stress as a mechanism underlying carcinogenesis (IARC, 2012).

62. The same research group (Hillegass *et al.* 2010) further examined the pathogenicity of asbestos as compared to other particles, including talc. The authors reported that their analysis of microarray data confirmed that lung cells were *"more responsive than ovarian cells to crocidolite asbestos or non-fibrous talc, and that crocidolite asbestos elicited greater responses in both cell types when compared to non-fibrous talc"*. As before, however, the group failed to test talc across a range of doses that would be necessary to examine its effects in these assays, using only doses that were equivalent to asbestos even though it was known that the crocidolite asbestos would be expected to be more potent in terms of biological reactivity than talc. The authors did, however, report that *"the pathogenesis of asbestos-associated diseases is most commonly associated with a persistent inflammatory response initiated by ROS, growth factors, and/ or various pro-inflammatory factors such as cytokines or chemokines"*. Therefore, this paper provided further evidence supporting the mechanism of inflammation and generation of reactive oxygen species as important to the tissue responses induced with exposure to particles that would include both asbestos and talc.

63. In a more recent study (Shim *et al.* 2015), the effect of talc to induce oxidative stress *in vivo* following administration of talc was examined. Rats were exposed to talc via whole-body inhalation at concentrations of 0, 5, 50 and 100 mg/m$^3$, six hours per day, five days per week, for four weeks. It should be remembered that in a GLP-quality lifetime study in rodents (NTP, 1993), rats were exposed to talc via whole-body inhalation at doses of 0, 6 and 18 mg/m$^3$, six hours per day, five days per week, and there was clear evidence of talc-induced chronic inflammation, reparative processes and cellular proliferation (as evidenced by lung pathological changes observed at interim sacrifices of 6, 11, and 18 months). This shorter-term study in rats by Shim *et al.* (2015) focused on understanding the role of oxidative stress in the tissue responses to talc, a general mechanism that has been linked to chronic inflammation and cancer, including ovarian

cancer (*e.g.,* Saed *et al.* 2017; Saed *et al.* 2018; Fernandes *et al.* 2015; Landskron *et al.* 2014; Kamp *et al.* 2011; Grivennikov *et al.* 2010; Lu *et al.* 2006; Rakoff-Nahoum, 2006; Senthil *et al.* 2004; Ness *et al.* 2000). The authors reported that inhalation of talc for four weeks was associated with macrophage aggregation and oxidative damage in the lung, including significantly increased expression of superoxide dismutase 2 (SOD 2), a biological indicator of oxidative damage.

64. In two other recent studies, the effects of talc exposure to induce oxidative stress in ovarian cancer cells has been investigated (Fletcher *et al.* 2018; Fletcher and Saed, 2018; both studies are available as abstracts only at this time). In the first study that was presented at a scientific meeting in March of 2018, the researchers reported on the ability of talc to affect markers of oxidative stress in ovarian cancer cells in culture (Fletcher *et al.* 2018). Both normal ovarian epithelial cells and cancerous ovarian epithelial cells were incubated with talc at concentrations of 0, 200 and 500 µg/ml for 24, 48 and 72 hours. The talc was purchased from Sigma Aldrich.[37] There was a marked increase in mRNA levels of pro-oxidant enzymes in both ovarian cell lines as compared to controls (untreated), and a marked decrease in mRNA levels of anti-oxidant enzymes in both cell lines as compared to controls (untreated cells). These changes, indicative of a pro-oxidant state in the cells (oxidative stress), were reported to occur as early as 24 hours after exposure. The authors concluded: *"This is the first report to show that talcum powder induces biological effect by further enhancing the redox state in both normal ovarian epithelial cells as well as ovarian cancer cells. The results of this study will provide a molecular basis to previous reports that link genital use of talcum powder to increased risk of epithelial ovarian cancer."* In the second study by this same laboratory (Fletcher and Saed, 2018), additional investigation of the effects of talcum powder on ovarian cancer cells was performed. The objective was to determine the effects of talcum powder on levels of the cancer antigen, CA-125, in both normal ovarian cells and ovarian cancer cells. The authors state that levels of CA-125 are elevated in more than 80% of women with advanced ovarian cancer and 50% of women with early stage cancers. Ovarian cells were exposed to 0 or 1000 µg/ml talc for 72 hours and levels of CA-125 were determined by ELISA methods. The authors report that there were increases in CA-125 levels in response to talc treatment in both normal and cancerous cells. The authors concluded: *"Talcum powder induces a biological effect by further enhancing CA-125 levels in ovarian cancer cells as well as in normal*

[37] The Sigma Aldrich website indicates that the talc sold is pharmaceutical grade talc.

*ovarian epithelial cells. This will provide a molecular basis to previous reports that link genital use of talcum powder to increased risk of epithelial cancer."* Moreover, in a recent review of the pathogenesis of ovarian cancer by Dr. Saed and colleagues (Saed *et al.* 2018), the importance of oxidative stress to pathogenesis and prognosis of ovarian cancer is discussed. The effects of talc in cells and tissues that are linked to oxidative stress provide additional insight into the molecular basis of talc-induced ovarian cancer in humans.

65. Talc body powders manufactured and sold by Imerys and Johnson & Johnson were a mixture of compounds, many of which have toxic properties. There is consistent evidence linking talc as well as the other components of talc with initiation of inflammation at the local site of exposure (discussed above), as well as evidence that talc induces biologic effects that result in pre-cancerous lesions (NTP, 1993). Inflammation is a well-studied mechanism of carcinogenesis (*e.g.*, Fernandes *et al.* 2015; Grivvennikov *et al.* 2010; Fleming *et al.* 2006; Lu *et al.* 2006; Rakoff-Nahoum, S. 2006; Ness and Cottreau, 1999). As discussed in a recent review of the topic of inflammation and cancer (Grivennikov *et al*. 2010), there are several basic facts about inflammation and cancer that include the following: (1) chronic inflammation increases cancer risk; (2) subclinical, often undetectable inflammation may be as important in increasing cancer risk; (3) various types of immune and inflammatory cells are frequently present within tumors; (4) immune cells affect malignant cells through production of cytokines, chemokines, growth factors, prostaglandins, and reactive oxygen and nitrogen species; (5) inflammation impacts every single step of tumorigenesis, from initiation through tumor promotion, all the way to metastatic progression; (6) in developing tumors anti-tumorigenic and pro-tumorigenic immune and inflammatory mechanisms coexist, but if the tumor is not rejected, the pro-tumorigenic effect dominates; (7) signaling pathways that mediate the pro-tumorigenic effects of inflammation are often subject to a feed-forward loop; and (8) certain immune and inflammatory components may be dispensable during one stage of tumorigenesis but absolutely critical in another stage. Therefore, in the case of talc, even if tissue samples from ovarian tumors fail to exhibit signs of active chronic inflammation, an inflammatory role for talc is not ruled out. Instead, the role of talc in inducing the tumorigenic response could be linked to earlier stages of cancer progression.

66. With respect to inflammation and ovarian cancer specifically, a recent prospective epidemiological study performed by investigators at the National Institutes of Health has linked specific pro-inflammatory markers in blood with the presence of ovarian cancer in women (Trabert *et al.* 2014); the authors suggest that these pro-inflammatory mechanisms may be linked to the increased risk of ovarian cancer seen in women exposed to compounds such as talc and asbestos. Other supporting evidence for a link of inflammation with carcinogenesis following talc exposure in women are the studies that have shown that talc exposure can induce oxidative stress in cells (discussed above). Therefore, there are multiple plausible mechanisms that may be related to the cancer hazard posed by perineal talc body powder exposure in women. Additionally, the fact that talc can act as a cancer promoter is also relevant (Stenback *et al.* 1986). Finally, it is important to note that the link of talc with inflammatory processes is an underlying toxic insult that can lead to cancer. This mechanism is consistent with mechanisms linked to other particles that induce cancer (*i.e.*, asbestos and silica; Moller *et al.* 2010, Moller *et al.* 2013; IARC, 1987; IARC, 2010). It is also important to realize that there is latency associated with cancer pathogenesis which would also apply in the case of talc.

67. When considered together, the scientific literature on the biological effects of talc, as well as asbestos and other constituents routinely found in talc (discussed above), provide sufficient evidence to show that these chemicals produce cellular changes that have been linked to carcinogenesis and that the biological mechanism for carcinogenesis (ovarian and/or lung) following exposure to talcum powder products likely involves induction of a chronic inflammatory response. A review of the IARC monographs for talcum powder product constituents, such as asbestiform talc and non-asbestiform talc, nickel, cobalt, and chromium, reveals similarities in the biological effects that are discussed as underlying the carcinogenic potential of the individual compounds. Moreover, available evidence indicates that local exposure to talc particles is likely involved, where "local exposure" means exposure at or near the site of injury, in this case exposure of the ovary and ovarian cancer. It is important to realize as well that in the case of almost any human drug used to treat a disease or symptoms of some condition, the exact molecular mechanism by which the drug produces its effects also are not known. Thus, not knowing every detail about the molecular mechanism underlying talcum powder products and carcinogenesis does not mean that the available data fail to provide support for a likely mechanism. In fact, we know some

important things about talc, information that supports the biologic plausibility of the relationship between talc exposure and human cancer. This mechanistic data provides highly plausible biological support for the signal for human cancer risk identified from the epidemiological (discussed below) and animal data.

68. When considered together with general principles of toxicology, the available data relating to mechanism of carcinogenicity of talcum powder products, where the body powders are a mixture of compounds with carcinogenic hazard, indicate that the various compounds in talcum powder products would be expected to produce at least an additive effect on the risk of cancer based on their ability to induce similar biological responses that underly carcinogenesis (Eaton, D.L. and S.G. Gilbert. 2013. Principles of toxicology. In: *Casarett & Doull's Toxicology: The Basic Science of Poisons, 8th edition*. Klaassen, C.D. (ed.). McGraw-Hill: New York: NY. Chapter 2, pp. 19-20; EPA, 2000). The likely mechanism for cancer is related to the similar cellular events that have been linked to carcinogenesis in the case of the known components of talcum powder products.

69. It is well-established that there are two types of chemical carcinogens: genotoxic and non-genotoxic (Klaunig, J.E. 2013). A genotoxic carcinogen is one that is mutagenic, may be a complete carcinogen, produces tumors that exhibit a dose-response relationship with exposure, and for which there is no threshold for cancer initiation[38]. A non-genotoxic carcinogen is one that is not a direct mutagen, exhibits a threshold for tumor development, produces tumors that exhibit a dose-response relationship with exposure, may only function as a tumor promoter, does not directly damage DNA, and may exhibit species, strain and tissue specificity in response. The available evidence indicates that talc may be a non-genotoxic carcinogen, as defined here, based on the evidence showing that it is not genotoxic (in most assays), requires repeated dosing of sufficient duration for tumors to be produced, has been shown to exhibit activity as a tumor promoter for known carcinogens (*i.e.*, benzo(a)pyrene; Stenback *et al.* 1986), exhibits species and tissue specificity in tumor responses (associated with local site of exposure), and has not been shown to directly damage DNA. The available animal cancer data has not been assessed for a threshold for tumor development, but the NTP study data did indicate that the tumor response was

[38] Asbestos has been identified as a genotoxic carcinogen.

a high dose effect. Human studies, however, have indicated that ovarian cancer exhibits a dose-response in terms of being associated with an increased duration of use and frequency of use of talc-based products (*e.g.*, Cramer *et al.* 1999; Terry *et al.* 2013; Wu 2015; Schildkraut *et al.* 2016; Berge *et al.* 2018; Penninkilampi and Eslick 2018). Therefore, the available evidence indicates that talc's plausible mechanism of action to induce cancer would be through non-genotoxic (indirect) pathways.

70. I also would like to point out that talc powder is used clinically to cause an acute inflammatory response in a procedure known as pleurodesis. This procedure is designed to cause the two layers of the lung pleura, parietal and visceral layers, to stick together so that the space between the layers is filled with scar tissue. Typically, only a few ounces of fluid would be found between the parietal and visceral pleural membranes, but the fluid can build up to as much as a few liters and is known as a pleural effusion. Both mechanical and chemical means are used to initiate the lung scarring that is needed to treat these effusions. In the case of chemical pleurodesis, a substance such as talc powder can be placed into the chest cavity near the lungs to produce an acute inflammatory response that leads to scarring. The size of the talc particles used in the procedure are important; severe inflammatory effects were more likely when a talc powder with smaller particles, about 50% less than 10 μm, was employed (Arellano-Orden *et al.* 2013). It is important to note that typical talcum powder products, including those manufactured and sold by Imerys and Johnson & Johnson, contain mostly small particles, less than 10 μm (Zazenski *et al.* 1995; JNJ000326966; IMERYS095244; IMERYS120564-565). Thus, the pleurodesis literature provide further support for inflammation as a known tissue response to talc, even though the type of inflammatory response produced in pleurodesis procedures is acute, not a chronic response as is characteristic of carcinogenesis.

71. As discussed above in paragraph 33, an increased human cancer risk has been linked to components of talcum powder products, such as asbestos. By the 1930's, evidence was available linking asbestos exposure with lung disease, including lung cancer; by the mid 1950's, the majority of scientists believed that asbestos could cause lung cancer, and likely other forms of cancer, in humans (Doll, 1955); and by the 1960's, evidence had accumulated linking asbestos exposure with ovarian cancer, with some studies reporting an increased incidence in women

exposed to asbestos. Beginning in the 1970's, the issue of ovarian cancer in women began to be discussed with respect to talcum powder product exposure (Henderson *et al.* 1971; Henderson *et al.* 1979). Since that time, the study of, evidence for, and discussion of, a cause and effect relationship between talc exposure and human ovarian cancer risk has continued to develop in light of the totality of the data (*e.g.*, Cramer *et al*. 1982; Hartge *et al.* 1983; Natow, 1986; Whittemore *et al.* 1988; Booth *et al.* 1989; Harlow and Weiss, 1989; Harlow *et al.* 1992; Chen *et al.* 1992; Rosenblatt *et al.* 1992; Tzonou *et al*. 1993; Cramer and Xu, 1995; Purdie *et al.* 1995; Shushan *et al.* 1996; Chang and Risch, 1997; Cook *et al.* 1997; Green *et al*. 1997; Daly and Obrams, 1988; Eltabbakh *et al*. 1998; Godard *et al.* 1998; Cramer, 1999; Wong *et al.* 1999; Ness *et al.* 2000; Langseth and Kjaerheim, 2004; Mills *et al*. 2004; Jordan *et al.* 2007; Merritt *et al.* 2008; Wu *et al.* 2009; Rosenblatt *et al.* 2011; Kurta *et al*. 2012; Terry *et al.* 2013; Houghton *et al.* 2014; Wu *et al.* 2015; Schildkraut *et al.* 2016; Berge *et al.* 2018; Penninkilampi and Eslick, 2018). A review of these studies as a whole shows that exposure to talc by routine genital application is reported to increase the risk of ovarian cancer in women by about 30% (*e.g.*, Cramer *et al.* 1982; Whittemore *et al.* 1988; Booth *et al*. 1989; Harlow and Weiss, 1989; Harlow *et al.* 1992; Rosenblatt *et al*. 1992; Purdie *et al*. 1995; Shushan *et al.* 1996; Chang and Risch, 1997; Cook *et al.* 1997; Cramer *et al.* 1999; Gertig *et al.* 2000; Ness *et al.* 2000; Mills *et al.* 2004; Merritt *et al.* 2008; Wu *et al.* 2009; Rosenblatt *et al.* 2011; Kurta *et al*. 2012; Terry *et al.* 2013; Schildkraut *et al.* 2016; Berge *et al.* 2018; Penninkilampi and Eslick, 2018). Not all studies identified in the published scientific literature have reported a statistically significant increased risk of ovarian cancer following talc exposure in women (*e.g.*, Hartge *et al.*, 1983; Chen *et al.* 1992; Tzonou *et al.* 1993; Godard *et al.* 1998; Wong *et al.* 1999; Langseth and Kjaerheim, 2004; Houghton *et al.* 2014). With such a large group of epidemiological studies, with varying designs, sizes of the populations studied, and varying measures of exposure, it is not surprising that there are studies that show both an increase in risk as well as those that failed to report such results. Yet, in the large group of studies (22 studies) reporting statistically significant findings, the increased risk is consistently seen to be in the range of 30%. Even in the studies that reported non-statistically significant findings, there often was a trend towards an increased risk in women who used talcum powder products. The human epidemiological data related to talcum powder product use and cancer risk in women, when considered in conjunction with the biological data on talc migration, as well as cellular and animal

data regarding inflammation and talc's induction of carcinogenicity, supports the conclusion that use of talcum powder products may pose a health hazard to women.

72. As a part of my risk assessment, I also considered whether there is a dose response. In the current case where the chemical of concern is a particle, and the route of exposure of concern is external application of a powder that then migrates internally, and the powder itself is a mixture of a variety of compounds some of which are known human carcinogens, the concept of dose is more complex. The human studies do not provide a measure of a single dose in terms that are typical of the cellular (*in vitro*) or animal studies, *i.e.,* mg talc per kg body weight, or mg talc per $m^3$ inhaled air, or mg talc per ml of solution. In the case of the talc database, dose for human is expressed terms of frequency and duration of exposure. It is a general principle of pharmacology and toxicology that just as the likelihood of a response increases with dose, the likelihood of a response increases with longer term use, and more frequent use (Eaton and Gilbert, 2013). The available *in vitro* and animal study data show that there is a dose-response relationship for talc toxicity (*e.g.,* EPA, 1992; NTP, 1993; IARC, 2010; Buz'Zard and Lau, 2007; Shukla *et al.* 2009; Shim *et al.* 2015). The animal cancer data, when considered in conjunction with the cellular data, indicate that talc is a carcinogen and there likely is a dose-response threshold for tumor development in rodents (NTP, 1993). There are several human studies that provide evidence of a dose-response relationship for talc exposure and ovarian cancer in women (see paragraph 69; Cramer *et al.* 1999; Terry *et al.* 2013; Schildkraut *et al.* 2016; Cramer *et al.* 2016; Berge *et al.* 2018; Penninkilampi and Eslick, 2018). Therefore, there are sufficient scientific data supporting the existence of a dose-response relationship for genital talc use and an increased risk of ovarian cancer.

73. In 1978, the U.S. Congress amended Section 301(b)(4) of the Public Health Service Act, to require the Secretary of the Department of Health and Human Services (DHHS) to publish an annual report that contains a list of all substances that *"are known to be human carcinogens or may reasonably be anticipated to be human carcinogens and to which a significant number of persons residing in the United States are exposed"*.[39] The process of producing the list, known as the Report on Carcinogens, or RoC, results from periodic meetings and is a process managed by

[39] https://ntp.niehs.nih.gov/pubhealth/roc/history/index.htm

the NTP on behalf of DHHS. There have been 13 RoC processes to date, the 13th RoC being published in 2014. Talc was considered as part of the 10th and 12th RoC processes. The 10th RoC meeting where talc was discussed was held in 2000, while the 12th RoC meeting on talc was held in 2005. The 10th RoC deferred action to list talc as a carcinogen, citing a need for additional information; the 12th RoC also deferred action to list talc. It is important to note that the NTP RoC nominated talc for consideration for listing in the 10th RoC based on a review of the available data by a body of scientists without input from industry, and without any direct interaction with other industry groups or representatives with a conflict of interest, consistent with the procedures set forth by IARC (IARC, 2006). Johnson & Johnson, Imerys, and PCPC influenced the 10th RoC process as I discuss later in paragraph 96. It is also important to note that a review of the minutes of the 10th RoC indicates that even though the only public comments made to the panel were from industry representatives, many of the reviewers supported listing non-asbestiform talc as reasonably anticipated to be a human carcinogen (IMERYS 039060 through 085).

74. In 2010, the International Agency for Research on Cancer (IARC) Working Group published its assessment of the carcinogenic potential of non-asbestiform talc. The review of talc had occurred in 2006 and included only those papers available up to 2006. It is important to note here that the IARC review process is not open for public comment and all conclusions reflect the consensus decisions made by global experts in their field and without influence from industry. Additionally, this review occurred after the NTP talc reviews had been completed. Unlike the NTP RoC reviews, the IARC panel was able to reach a consensus regarding the cancer risks posed by talc. The IARC panel concluded that perineal use of non-asbestiform talcum powder products was *"possibly carcinogenic to humans"* (a Group 2B classification) and inhalation of non-asbestiform talc was *"not classifiable as to its carcinogenicity"* (a Group 3 classification). This finding provided additional evidence for the weight-of-the evidence assessment I performed. It should be noted that the 2006 IARC panel did not have access to the reports of Terry *et al.* (2013), Wu *et al.* 2009 and 2015, Schildkraut *et al.* (2016), Berge *et al.* 2018, and Penninkilampi and Eslick, 2018). See also paragraph 71. These additional studies provide further evidence of the link of talc exposure in women and an increased risk of ovarian cancer. Terry *et al.* (2013) performed the largest meta-analysis to date with the talc database. The authors reported that genital use of talcum powder products significantly increased the risk of all types of ovarian cancer. The paper by

Schildkraut *et al.* (2016) provided support for the existence of a dose-response relationship between talc use and increased risk of ovarian cancer in women. Berge *et al.* (2018) reported a statistically significant increased risk of serous carcinoma of the ovary, as well as the identification of a dose-response relationship (increased duration of use). Penninkilampi and Eslick (2018) performed another meta-analysis of the studies in women exposed to talc through perineal dusting with talc body powders and reported that *"there is a consistent association between perineal talc use and ovarian cancer"*. These additional studies add to the weight of evidence that genital use of talcum powder products may be a health hazard.

75. Therefore, the weight-of-the-evidence indicates that genital exposure to talcum powder products increases the risk of ovarian cancer in women. This conclusion is supported by data that includes, but is not limited to the following: (1) the known toxic effects of talc and the other components of talcum powder products; (2) studies that have identified the biologically plausible mechanisms for cancer in humans; (3) the likelihood that talc particles can reach the ovaries; (4) the existence of a dose-response relationship for toxicity including the risk of cancer; and (5) the large human database that includes studies conducted over a period of 40 years showing a consistent signal for ovarian cancer in women exposed to talcum powder products.

## VII. The Role of Industry in Talcum Powder Product Safety Assessments

76. In support of my opinions, I have reviewed and considered thousands of documents related to the actions of Johnson & Johnson, Imerys, and PCPC with respect to talc and human health risks and safety assessment. The documents related to Johnson & Johnson date back into the 1950's and 1960's (*e.g.*, patents filed by the company; studies published by company employees; internal company documents). Documents related to Johnson & Johnson and the PCPC date back to the 1970's (*e.g.*, internal company documents; exhibits to depositions of company employees or corporate representatives). Documents related to Imerys and the PCPC date back to the 1990's (*e.g.*, internal company documents; exhibits to depositions of company employees or corporate representatives). The evidence shows that the defendants worked both individually and collaboratively to present a uniform position to regulators, the scientific and medical community, and consumers, that talcum powder product use did not present a risk of ovarian cancer in humans.

77. Evidence supporting Johnson & Johnson's early efforts to influence the safety information disseminated publicly about talc in the late 1970's involved the 1975 U.S. Pharmacopeia (USP) listing for talc. Based on their efforts, the USP listing was changed in 1980 to omit the warnings *"Do not apply to open wounds"* and *"Do not inhale"* (JNJ000343613; JNJNL61_000030770; JNJ000343580; JNJ000343612; JNJ000343614; JNJ000343946; JNJ000343611; trial testimony of Dr. John Hopkins dated February 8, 2018). Johnson & Johnson relied on their assertion that there was no asbestos present in talc that met the USP standards, even though evidence shows they were aware of the presence of some level of asbestos in their products at that time (as discussed above). Moreover, by the 1970's Johnson & Johnson was aware that some scientists believed that exposure standards for asbestos should be applied to fibrous talc (JNJ000231422-428). Evidence suggests that industry knew or should have known about the significant human health risks posed by exposure to cosmetic talc body powders well before 1975. Therefore, the evidence suggest that Johnson & Johnson failed to provide accurate information to the USP regarding the issue of the presence of asbestos in talc. Moreover, in asserting that *"normal exposure to cosmetic talc presents no inhalation hazard"* (JNJNL61_000030770), the company was making statements that were not scientifically defensible given the knowledge available by 1975 concerning talc and the hazards of inhalation exposure (as discussed above). Therefore, it is my opinion that Johnson & Johnson knew or should have known that use of cosmetic talc body powders had been reported to lead to lung injury when the talc was inhaled, and to lead to adverse tissue reactions when internal tissues were exposed to talcum powder products.

78. Also, in the 1970's, documents show that Johnson & Johnson made efforts to influence the science around the issue of asbestos in talc and the link of talc with ovarian cancer (P-0055; P-0344; P-0002). The efforts included a discussion with the FDA Commissioner in 1974 where Johnson & Johnson stated: *"Our very preliminary calculation indicates that substantial asbestos can be allowed safely in a baby powder."* (P-0660). Later in the same document Johnson & Johnson states that *"if the results of any scientific studies show any questions of safety talc, Johnson & Johnson will not hesitate to take it off the market"* (P-0660). Given the fact that Johnson & Johnson was aware, or should have been aware, of the science that had accumulated by that time linking asbestos exposure with both ovarian cancer and lung cancer, the position by the company regarding the presence of any asbestos in talc body powders is inconsistent with protecting public

health when the issue involved exposure to a cosmetic product, one without any benefit. Importantly, consumers were not informed of the safety concerns regarding the presence of asbestos in talcum powder products.

79. In discussing the issues related to industry and its actions to influence the public perception of talc safety, it is important to understand the role of the CIR in cosmetic ingredient safety assessments. As already mentioned above, the CIR process is industry-funded and is administered independent of the FDA. While FDA may consider CIR conclusions, the FDA does not adopt their findings (PCPC_MDL00096145, PCPC_MDL00044971, Deposition of Dr. Linda Loretz). The panel's role is to review the available safety information for the ingredient and to come to a consensus about its safety. The CIR reports are open for public comment before they are finalized. Over the years, the CIR has reviewed and reported on over 5,000[40] ingredients, yet only 12 have been found to be "unsafe" for use.[41] The current CIR meetings involve no more than two days of discussion for ingredients and ingredient groups (talc was one ingredient amongst a multitude of ingredients in 17 ingredient groups) during which time the panel reviews the data and comes to its conclusions regarding ingredient safety (deposition testimony of Dr. Linda Loretz October 1 and 2, 2018). None of the CIR expert panel members personally review the relevant published studies; instead, the members review only the report drafted by CIR staff (see testimony of Dr. Andersen pages 3157-3158, *Echeverria v. Johnson & Johnson*). This is a much more abbreviated review process than is employed by IARC when it is making a cancer hazard assessment.[42] For example, in the IARC reviews, the Working Group, drafts the consensus document as a group while working together for seven to eight days (MDL_KELLY00002701-2702). Care is taken to ensure that detailed summaries of studies are written by relevant experts, unlike the CIR reports which are written by employees of the PCPC instead of the experts on the panel. Also unlike the IARC review process, where panel members chosen for a review are ones with specific expertise in the scientific issues that are addressed for a chemical (IARC, 2006), the CIR panel typically includes less specialized scientists; and the make up of the panel changes little from meeting to meeting even though the issues raised for individual ingredients could be very

[40] Testimony of CIR Director from 1993 to 2013, Dr. Alan Andersen dated 8/10/2017 (Echeverria v. Johnson & Johnson).
[41] https://www.cir-safety.org/cir-findings
[42] See description of the process at: http://monographs.iarc.fr/ENG/Preamble/currentbscientificintro0706.php

different (see deposition testimony of Dr. Linda Loretz in 2018). Therefore, from a scientific perspective, the IARC process involves a much more detailed scientific evaluation of the issues surrounding a cancer hazard than the issues addressed by any CIR review.

80. In deposition testimony over several days in 2018[43], corporate representatives of the PCPC provided detailed descriptions of the CIR process. The testimony of the former Director of the CIR (Dr. Andersen in Echeverria v. Johnson & Johnson dated 8/10/2018) also provided details about the CIR process, including the talc process, and the close relationship with industry. Additional information can be found in internal company documents as well (*e.g.*, P-0561; P-0595). The lack of independence of the CIR process from PCPC operations and influence by industry is apparent after review of these sources, even though a different impression is given through the CIR website. For example, at the CIR website the following is stated:

> *"The Cosmetic Ingredient Review was established in 1976 by the industry trade association (then the Cosmetic, Toiletry, and Fragrance Association, now the Personal Care Products Council), with the support of the U.S. Food and Drug Administration and the Consumer Federation of America. Although funded by the Council, CIR and the review process are independent from the Council and the cosmetics industry."*

As will be discussed below with respect to the talc CIR review, the process was not independent of industry, did not include physicians with expertise in gynecological cancer or female pelvic anatomy, and involved a truncated discussion among the panel members as compared to the IARC assessment process.

81. The CIR has set forth procedures for its safety assessments (CIR 2018; IMERYS 118788). As discussed in the CIR procedures document, the purpose of the CIR is to *"determine those cosmetic ingredients for which there is a reasonable certainty in the judgement of competent scientists that the ingredient is safe under its conditions of use"*. The same document defines "safety" or "safe" to mean that there is "***no evidence in the available information*** *that*

[43] Dr. Linda Loretz of the PCPC was deposed as a corporate representative of the PCPC on 17 July 2018, 1 October 2018, and 2 October 2018. Mr. Mark Pollack was deposed as a corporate representative of the PCPC on 28 July 2018.

*demonstrates or suggests reasonable grounds to suspect a hazard to the public under the conditions of use that are now current or that might reasonably be expected in the future" [**emphasis** added]*. Based on this definition of *"safe"* and the purpose stated by the CIR, this means that the standard applied to a CIR review, and that should guide the outcome of that review, is whether there is evidence that demonstrates or suggests a hazard. If there is any such evidence of a hazard under conditions of use, then the standard would not be met, and the ingredient should not be deemed safe for use in cosmetics.

82. In the case of talc, a final version of the CIR panel report was published in 2013 (CIR, 2013) and then appeared in the published literature in 2015 (Fiume *et al.* 2015). The CIR panel stated that talc is *"safe in the present practices of use and concentration in cosmetic products"* (CIR, 2013). There was no CIR report published on talc before 2013 even though there was evidence for concern about the safety of talcum powder products that had been voiced within the scientific community for decades and that reliable evidence had been published in peer-reviewed journals even before the CIR came into being in 1978 (as discussed above). Based solely on the CIR standard for safety, existing evidence provided a reasonable basis for finding that the perineal use of talcum powder products increases the risk of ovarian cancer. Moreover, as discussed above with respect to the issue of talc migration, I described how that assessment was incomplete and resulted in conclusions that are not supported by available science.

83. Important evidence in support of my opinions comes from admissions contained in documents and testimony by the trade organization known in the past as the CTFA, and since 2007 known as the PCPC. Publicly available documents show that PCPC has been intimately involved with talc safety issues over the period from the early 1970's up to today (see deposition testimony of Dr. Linda Loretz, page 700). Together with Johnson & Johnson and Imerys, PCPC coordinated and presented a position to regulators and the medical community that talc was safe. This position was presented regardless of significant evidence to the contrary.

84. In their deposition testimony in 2016 and 2018, Mr. Mark Pollak and Dr. Linda Loretz, the designated PCPC corporate representatives, provided details on the close relationship between the CIR panel work generally and the PCPC, as well as the talc review itself. Other

documents available for review confirm the close relationship (*e.g.*, IMERYS 329339 through 329342; IMERYS315001; IMERYS320614; IMERYS281069; IMERYS281536; IMERYS283501; IMERYS322846; IMERYS298968; IMERYS065205; IMERYS118788; PCPC_MDL00103539; PCPC_MDL00009859; PCPC_MDL00009893; PCPC_MDL00009914; PCPC_MDL00009950). This is an important consideration in this case given the role that the CIR plays in cosmetic safety assessments, assessments that are used by manufacturers to assert that their ingredients are safe as required by FDA.

85. Testimony and admissions from PCPC corporate representatives including exhibits to their depositions, are relevant to my opinions because they outline the level of influence on the purportedly independent processes for talc safety assessment by the CIR. To start, the PCPC's president is the chairman of the CIR steering committee that is responsible for choosing the experts that are on the CIR panel, including the talc review in 2013 (deposition of Dr. Loretz pages 842-845; IMERYS118788; trial testimony of Dr. Andersen dated 8/10/2018 pages 3130-3031). The CIR review documents are written not by the expert panel but by CIR staff, who are employees of the PCPC (PCPC0004567; IMERYS118788; trial testimony of Dr. Andersen 8/10/2018). The CIR panel scientists are a standing committee, meaning that the scientists involved do not change that much from review to review, regardless of the issues to be addressed (see deposition of Dr. Linda Loretz pages 842-845; trial testimony of Dr. Andersen 8/10/2018 pages 3132-3133). This is important because the issues related to talc safety are not the typical issues linked to cosmetic ingredients. For most cosmetic ingredients, the issue is not migration internally after perineal application or even use of large amounts of product that can easily suspend in air with each use. Additionally, much of the data that was important in the evaluation of talc as an ingredient in body powders and perineal dusting was human epidemiological data. Yet, the expert panel reviewing talcum powder products and talc as an ingredient in those powders did not include anyone with specific expertise in the unique exposure issues presented or expertise in epidemiology (deposition testimony of Dr. Loretz pages 781, and 838-842). All CIR panel members are paid through the PCPC which in turn is funded by industry, including Johnson & Johnson and Imerys[44]. In fact,

[44] Although Imerys is no longer a member of the PCPC (see deposition testimony of Dr. Loretz), Imerys was a member of the PCPC during the years that talc safety was at issue (1980's, 1990's, 2000's) and during the time of the CIR review of talc (2010-2013). See also IMERYS311275.

records show that many of the CIR panel members made tens of thousands of dollars each year that they served on the CIR panels (see deposition testimony of Dr. Loretz pages 964-974), and that Johnson & Johnson and Imerys were major sources of funding for the PCPC (see deposition testimony of Dr. Loretz pages 829-834) and, consequently, the CIR panel activities. The CIR review of talc was initially started in 2009 but was put on hold for three years before beginning again in 2012 (see trial testimony of Dr. Andersen 8/10/2018 page 3148).

86. Another example of influence on the FDA comes from the industry's response to the filing of two Citizen's Petitions related to adding a cancer warning to talcum powder products. Before continued discussion of the CIR process and industry influences, these events should be examined. This was discussed in the October 1, 2018 Loretz deposition.

87. An important series of events relevant to my opinions occurred with respect to talc related to filing of two Citizen Petitions, one in 1994 and a second in 2008. In 2014, the FDA finally issued a response to those Petitions. In my experience, this is a very long time to wait for an FDA response. As background, the Citizen's Petition process is one that anyone outside of the FDA can use to ask FDA to take, or refrain from taking, an action related to any of the products regulated by FDA (21 CFR Part 10). Two Citizen Petitions were filed by the *Cancer Prevention Coalition,* both related to adding a cancer warning to cosmetic talc products. In the case of the 1994 Petition, Dr. John Bailey, then Acting Director of the Office of Cosmetics and Colors within CFSAN at FDA, responded to the November 1994 Petition on July 11, 1995. Dr. Bailey stated that FDA had not been able to reach a decision on the Petition within the first 180 days of the filing (as required by the regulations) and the reason given was *"because of the limited availability of resources and other agency priorities"* (P-240). In the case of the 1994 and the 2008 Petitions, the FDA did not formally respond to the Petitioner until April 1, 2014 (FDA, 2014). The FDA's 2014 response indicated that FDA was not requiring addition of the specific cancer warning requested by petitioner.

88. Evidence supporting my opinions regarding the influence of industry on FDA's actions is also available. An email dated November 3, 2008 reveals Kathy Wille, Senior Director, Scientific and External Regulatory Policy, Product Stewardship, from Johnson & Johnson *"had a*

*side conversation with a key figure from the FDA cosmetic group that is responsible for responding to the Citizen's Petition."* The email further states: *"He indicated that the FDA would rule against the petition and would not require warning labels on cosmetic products. But the FDA is looking for* ***scientific support*** *from industry that will help justify their position. She suggested that there is a collective group working to have comments submitted to the FDA."* (IMERYS 250983; IMERYS 281179). *[****emphasis*** *added]* On July 21, 2009, the PCPC submitted comments on the Petitions to FDA (PCPC_MDL00015494; P-342). A review of the cover letter for the comments reveals that Dr. John Bailey, the same Dr. Bailey that was Acting Director of the Office of Cosmetics and Colors in 1995 and that responded to the first Petition by the Cancer Prevention Coalition, signed the 2009 letter as an employee of the PCPC. The letter was accompanied by a report prepared by Dr. Michael Huncharek and Dr. Joshua Muscat, consultants that had been hired by the PCPC to prepare a response. The defendant's response to the Citizens Petition contained misleading and inaccurate information, including that asbestos had been eliminated from talc which was an issue that was of concern to the FDA (see deposition of Dr. Linda Loretz).

89. Other documents reveal that Dr. Huncharek and Dr. Muscat had been working as consultants for Johnson & Johnson and Imerys for years (JNJ000377405; JNJ000375565; JNJ000391641), providing the companies and/or the PCPC with consulting services related to talc and cancer risk as part of the NTP process in 2000 and 2005 and the IARC process in 2006 (see deposition testimony of Dr. Nicholson dated July 26, 2018 and deposition testimony of Dr. Linda Loretz, Ph.D. October 1, 2018), as well as the talc Citizen Petition response process. Another document shows that in May 2009, PCPC members, including Johnson & Johnson and Imerys, met with FDA to discuss their comments before they were submitted in July 2009 (PCPC0028174-28176; JNJ000092018), even though FDA denied the *Cancer Prevention Coalition* the opportunity for a public hearing to discuss their scientific evidence that the Petitioner had requested both in 1994 and in 2008. The failure of FDA to afford the Petitioner a public hearing and request a more detailed examination of the Petitioner's scientific evidence to elicit a response to questions raised about talc safety in 1994 and in 2008 resulted in a process wherein industry was the sole source of information.

90. The evidence reviewed shows that the FDA did not hold a public hearing which would have allowed for more detailed input from scientists outside of industry. Moreover, as discussed above in some detail, the FDA was not, and has not even today, provided with all available evidence of the existence of the presence of contaminants such as asbestos in cosmetic talcum powder products. As a result, it is my opinion that the conclusions reached by FDA in its 2014 response were not based on an accurate and complete understanding of the composition of talcum powder products. In addition, evidence shows that the FDA was not fully informed about the key role that certain consultants to industry had played in generating some of the scientific studies and review papers that industry has used to support their assertions regarding the safety of talc. For example, the 2003 paper by Huncharek and colleagues (Huncharek *et al.* 2003. *Anticancer Res*. 23:1955-1960) failed to acknowledge that industry had provided support for their work, while later papers failed to acknowledge the full list of industry sponsors of their work (*i.e.*, Huncharek *et al.* 2007. *Eur. J. Cancer Prevent*. 16:422-429; Muscat and Huncharek. 2008. *Eur. J. Cancer Prevent*. 17:139-146; Huncharek and Muscat. 2011. *Eur. J. Cancer Prevent*. 20:501-507; see deposition testimony of Dr. Nicholson dated July 26, 2018). A 2005 response written by Dr. Muscat and Dr. Huncharek to critique the work of Dr. Cramer (Muscat and Huncharek, 2005) also failed to disclose the financial relationship between his work and industry (JNJ000368327; see depositions of Dr. Nicholson and Dr. Loretz).

91. Prior to the CIR review of talc, there were significant events in the 1980's and early 1990's that triggered the need for a safety assessment of the products. The NTP had performed cancer studies in mice and rats in the 1980's that were published in 1993 (NTP, 1993; the report was discussed in detail above). In addition, by 1993, several scientific and/or epidemiological studies had appeared in the scientific literature linking perineal talcum powder product use with ovarian cancer in women (*e.g.*, Henderson *et al.* 1971; Cramer *et al.* 1982; Hartge *et al.* 1983; Whittemore *et al.* 1988; Booth *et al.* 1989; Harlow and Weiss, 1989; Harlow *et al.* 1992; Chen *et al.* 1992; Rosenblatt *et al.* 1992). As a result, a workshop was held in 1994 that was sponsored by industry and the FDA (PCPC_MDL00026142; PCPC_MDL00028481; PCPC_MDL00028665; PCPC0072694; PCPC0075364; P-14). FDA's opening remarks at the workshop indicated that the FDA was wanting input on the *"validity and significance of the existing knowledge regarding the safety of cosmetic talc"* (Carr, 1995). The workshop was run by a group known as the ISRTP, the

*International Society for Regulatory Toxicology and Pharmacology*. The ISRTP has been described as *"an association dominated by scientists who work for industry trade groups and consulting firms"* (Michaels, 2008). Sponsors of the organization in the past have included major tobacco companies, chemical companies, and drug manufacturing companies (Axelson *et al.* 2003). The ISRTP also publishes a journal (*Regulatory Pharmacology and Toxicology*) and as pointed out by Axelson and colleagues (2003) the articles published often failed to list complete conflicts of interest disclosures. As a result, the ISTRP's activities have been questioned in terms of the level of industry influence that exists (Axelson *et al.* 2003).

92. The ISRTP talc workshop was held in 1994 (January 31 to February 1). The minutes to the meeting are available for review as are the papers that were published after that meeting in the ISRTP journal (1995; volume 21; pages 211-260). One day of the meeting was devoted to the issues related to the NTP cancer studies with talc and the issue of mechanisms of lung carcinogenesis (January 31, 1994), while the second day was devoted to the epidemiological data that had accumulated with respect to talc exposure in women and ovarian cancer and the issue of talc migration (February 1, 1994). Industry-sponsored scientists were among those attending and making comments during the meeting (P-0017). My review of the minutes to the workshop (PCPC0076689-76908; JNJ000008704-8864) as compared to the published summary of the workshop (Carr, 1995) reveals important differences in the actual statements made by scientists at the meeting and the published paper. The paper acknowledges that not all presentations were published. The workshop attendees are listed by Dr. Carr (Carr, 1995) and included 109 participants. At least 67 were from industry or were consultants to industry. Other participants were from government agencies (25 participants) and from academics or public interest groups (17 participants). Key differences in the minutes versus the published summary of the meeting included the fact that not all participants were present at the end of the meeting when the group discussed the workshop findings. Contrary to the statements in the Carr publication regarding *"unanimous assessment"* (Carr, 1995), the statement made on the second afternoon of the workshop was as follows: *"It is not our intent, certainly not mine to strive for consensus, either as a unanimous consensus or a partial consensus which I understand you have to have to use now in describing a consensus…"* (JNJ000008843). Questions were raised by scientists at the meeting on the first day related to the fact that the animal data had limitations but that it still had relevance in

terms of raising questions about the ability of talc to cause lung injury that could lead to cancer. On the second day, one speaker, Dr. Austin, indicated the epidemiological data provided some evidence of an association between talc and ovarian cancer (JNJ000008727). Then, Dr. Brown, another presenter, discussed the issue of talc migration to the ovaries and specifically stated *"the summary of my conclusions is that I believe it can"* (JNJ000008734)). In contrast, the Carr publication states *"Following a presentation by Dr. Brown (university of Wisconsin), the discussion made it clear that available histologic and physiologic studies provide no basis to conclude that talc can migrate to the ovaries from the perineal region"* (page 215 of Carr, 1995). Thus, based on the large amount of information that was not discussed at the ISRTP workshop but was known to industry, it is my opinion that the Carr publication fails to provide an accurate and complete description of the state of the science with respect to talc safety in 1994. Moreover, an important outcome of this workshop was that the signal of talc and human cancer risk existed and could not be ruled out based on discussion at the workshop.

93. Additional evidence which supports my opinions comes from documents describing the industry response to the 1993 NTP publication of findings on talc and cancer in rodents, wherein the NTP concluded that talc was carcinogenic in animals. PCPC along with industry members re-activated the group known as the Talc Interested Party Task Force (*e.g.*, P-14; P-83; P-57). The Talc Interested Party Task Force was first established in the 1970's and reconvened in response to the publication of the paper by Dr. Cramer (Cramer *et al.* 1982), where use of cosmetic talc had been linked with ovarian cancer (P-0845). At this time, the group was led by Johnson & Johnson and the talc ingredient supplier Imerys. Documents from that time show that the goal was to mount a defense strategy around talc and to ensure that the products continued to be sold without regulation (*e.g.*, P-57; P-122; P-86; P-87; P-88; P-90; P-20). Yet, at least in the case of Johnson & Johnson, an outside consultant that had worked with the company for years on talc issues (Dr. Wehner) had suggested in 1994 that studies be performed to answer questions about talc safety, specifically with respect to the risk of ovarian cancer (P-0435). From my review of the depositions and documents, there is evidence that industry had no interest in sponsoring any new research or did not want to spend the money on such research (P-32, see deposition of Dr. Linda Loretz).

94. In formulating my opinions, it was relevant to consider evidence surrounding the activities by industry in the 2000's when NTP was considering whether or not to classify and list talc as a carcinogen as part of its Report on Carcinogens process. As of 1978, Section 301(b)(4) of the Public Health Service Act, as amended, requires that the Secretary of the Department of Health and Human Services (DHHS) publish an annual report on substance use and abuse. The Report on Carcinogens (RoC) is a report that lists all substances that are known to be human carcinogens or may reasonably be anticipated to be human carcinogens. As discussed on the NTP website[45], the first RoC was published in 1980, and since that time, the process has evolved in terms of the way that reviews are performed. In the early RoC process (up through the 7th RoC in 1994), there were formal listing criteria and two categories (*"known human carcinogen"* and *"reasonably anticipated to be a human carcinogen"*) that were determined based on evaluation of cancer studies in humans and/or experimental animals. Starting with the 8th RoC process, the criteria for listing were expanded to include consideration of all relevant information such as mechanistic data. During the period that talc was reviewed as part of the 10th RoC in 2000, the review process included two federal review groups providing initial input on listing recommendations, followed by review by the NTP Board of Scientific Counselors Subcommittee that provided input on listings in a public forum, giving additional opportunities for public and/or industry input. As a result, the first two reviews undertaken were by government scientists and free from outside influence, while the last step in 2000 involved public input and review by a Board that included members from industry (as discussed in more detail below).

95. Deposition testimony and documents show that, in the context of my opinions that industry undertook significant efforts to influence regulatory bodies and the science concerning the safety assessment of talcum powder products, the Center for Regulatory Effectiveness (CRE) played an important role. Based out of Washington, DC, the CRE is a "consulting firm" (http://www.thecre.com/about.html; C&M-LUZ 00013326; IMERYS 226115). The CRE's primary purpose is to provide advice to companies and to intervene on regulatory issues that threaten their business (IMERYS 226115). With respect to talcum powder products, documents show there were two individuals from CRE that were involved: the company's founder and owner, James "Jim" Tozzi and William "Bill" G. Kelly, Jr. Imerys initially retained the CRE in 2000 to

[45] https://ntp.niehs.nih.gov/pubhealth/roc/history/index.html

assist with the 10th RoC process at NTPNTP (IMERYS 100237) and the CRE's consulting work with Imerys continued for more than a decade. Yet, documents show that the CRE represented themselves as being an *"independent"* organization and *"not affiliated"* with any particular industry, company, or other entity. (IMERYS 100151 and MDL_KELLY00014222). Documents also show that CRE efforts on behalf of Imerys led to sufficient confusion regarding the definition of talc such that NTP's Executive Committee reversed the scientists' classification of talc as a carcinogen (IMERYS 330351, IMERYS 303828, IMERYS 110806, IMERYS 209930). CRE efforts on behalf of industry continued with their interaction with the CIR and the production of the 2013 CIR safety assessment of talc (IMERYS 226115; MBS-CRE 000031, MDL_KELLY00017550, MDL_KELLY00014222, MBS-CRE000271).

96. There have been 14 RoC processes to date, the 14th RoC being published in November 2016 (the 15th RoC is in draft form and would be due out this year). Talc was considered as part of the 10th and 12th RoC processes. The 10th RoC meeting where talc was discussed was held in 2000, while the 12th RoC meeting was held in 2005. The 10th RoC deferred action to list talc as a carcinogen, citing a need for additional information; the 12th RoC also deferred action to list talc. It is important to note that the NTP RoC nominated talc for consideration for listing in the 10th RoC based on a review of the available data by a body of scientists without input from industry, and without any direct interaction with other industry groups or representatives with a conflict of interest, consistent with the procedures set forth by IARC for its cancer reviews (IARC, 2006). It is also important to note that a review of the minutes of the 10th RoC indicates that even though the only public comments made to the panel were from industry representatives, many of the reviewers supported listing non-asbestiform talc as reasonably anticipated to be a human carcinogen (IMERYS 039060 through 085). During the 2000 NTP review of talc for listing in the 10th RoC, it is my opinion that Imerys, the PCPC, and Johnson & Johnson made efforts to influence the process and prevent talc from being listed as a carcinogen (*e.g.*, P-0255; P-0012; P-0013; P-0089; P-0317). Documents show that Imerys, with the full knowledge of Johnson & Johnson and PCPC, hired the Center for Regulatory Effectiveness (CRE) in 2000 to submit comments to influence the RoC process without disclosing that defendants coordinated and were directly involved in both the strategy for and the drafting of those comments (IMERYS024243; IMERYS-A_0024244; JNJ 000242897; JNJ 000404803; JNJ 000001699; PCPC0072893; NTP Summary

Minutes, Dec. 13-15, 2000). This effort to influence the process continued into 2001 when the Executive Committee of NTP met and made the decision to defer talc even though the scientists that had reviewed talc had overwhelmingly voted to list talc as a carcinogen (*e.g.*, IMERYS024367; IMERYS 303895-898; P-27; JNJ000013664; JNJ000404511-512; PCPC0066630-672; IMERYS-A_0024411; IMERYS303842; IMERYS288570; IMERYS239852; IMERYS239750; IMERYS239749; IMERYS026529; IMERYS024243; JNJ000008350; JNJ000008344; JNJ000000636; JNJ000368187; JNJ000404425; NTP minutes 2000; IMERYS303828; IMERYS179104; IMERYS208830; IMERYS-A_0024244; PCPC0035777; PCPC0066630). At least by 2002, evidence shows that Imerys was aware of the consequences of listing talc as a carcinogen in terms of product liability issues (P-26; P-3). Evidence shows that industry was aware that, the NTP was more vulnerable to such influence than other bodies such as IARC (P-27). Additional documents provide evidence that efforts to influence the NTP cancer listing process by industry continued in 2004-2005 when talc was scheduled to be considered as part of the 12th RoC process (JNJ00003646-348; IMERYS288692; IMERYS271234; IMERYS035406; JNJ000003436; JNJ000003472; JNJ000375565; JNJ000369203; IMERYS287089; IMERYS324762; IMERYS 236653).

97. IARC has reviewed talc twice, and its conclusions were published first in 1987 and again in 2010. In contrast to the CIR review process which involved a much more cursory review of the science behind over 5000 cosmetic ingredients in the 40 plus years of its existence and only 12 were found to be unsafe for use in cosmetics, IARC was founded in 1965 and in that time has published 122 volumes describing the cancer hazard posed by 1016 different compounds. Of those compounds reviewed by IARC, 120 were found to be *"carcinogenic to humans"*, 82 were found to be *"probably carcinogenic to humans"*, 302 were found to be *"possibly carcinogenic to humans"*, 501 were found to be *"not classifiable as to its carcinogenicity to humans"*, and one compound was found to be *"probably not carcinogenic to humans"*[46]. IARC focuses solely on the issue of cancer hazard and prioritizes its reviews based on compounds where evidence has accumulated indicating there may be a cancer hazard.

[46] https://monographs.iarc.fr/agents-classified-by-the-iarc/

98. In the first assessment of talc (IARC, 1987), the panel met in 1986 and concluded that there was sufficient evidence for human carcinogenicity for talc containing asbestiform fibers (asbestos and fibrous talc) but inadequate evidence for talc not containing asbestiform fibers. Talc with asbestiform fibers was listed as Group 1 (known human carcinogen); talc without asbestiform fibers was listed as Group 3 (not classifiable as to human carcinogenicity). In 2006, IARC again considered the classification of talc as a carcinogen. The working group considered a large body of data available up until 2006, which included a large group of human epidemiological studies examining the risk of ovarian cancer with perineal talc use in women. Although industry was aware that the IARC process was less political (P-27), evidence shows that, consistent with my opinions regarding industry's influence on the talc regulatory processes, industry still initiated efforts to influence the science surrounding talc and cancer risk (JNJ000003914-315; JNJ000004015-4019; JNJ000003969; JNJ000369087; JNJ 000003911; JNJ 000003969). These efforts included having Dr. Muscat, a consultant to industry (IMA-NA0000571; JNJ000369543; Deposition of Joseph Muscat; Muscat000001494; Muscat000001204) attend as an observer and to attempt to influence reviewers with his comments. Other documents provide additional information about the attempts by industry to influence the IARC process in 2006 (*e.g.,* P-0650; P-0204; P-0035; WG-IMA-NA0001554). It is notable that the IARC panel, with less chance of outside influence being asserted, listed talc without asbestiform fibers as a carcinogen (Group 2B; possibly carcinogenic to humans). Following the IARC classification of talc, Imerys elected to add a cancer listing to its MSDS sheet for talc as a possible human carcinogen. Johnson & Johnson has refused to do the same on its MSDS for finished products (JNJ000390337-338; JNJ4T5_000004521-522). The failure of Johnson & Johnson to warn consumers, and even workers that are involved in handling of their products, about the cancer risk associated with use or exposure to talcum powder products is a public health concern. In addition, when talc was listed as a possible human carcinogen by IARC in 2006, documents show that industry continued to promote a message about talc safety by recruiting scientists to publish articles that raised doubt about the link of perineal talc use and ovarian cancer (*e.g.*, P-78; P-92).

99. Returning now to consideration of the CIR process for talc in 2012-2013, documents suggest that industry was intimately involved with the CIR process and its review of talc safety. Important details related to the influence exerted by industry on the overall CIR process

as well as the talc review itself is found in the trial testimony of Dr. Alan Andersen (dated August 11, 2017). Dr. Andersen was in charge of the CIR process and was an employee of the PCPC. Dr. Andersen was responsible for implementation of the talc CIR review process. His testimony and the accompanying documents showed that at least two of the CIR expert panelists that he allowed to participate had conflicts of interest that were not publicly disclosed, and that Mr. Kelly of the CRE provided assistance to the CIR during its talc review. Some of the language in the final CIR talc review documents was copied directly from comments made by the CRE. Additionally, Dr. Andersen was not aware of the fact that the CRE had been hired by Imerys and the talc industry to provide comments to CIR. Additionally, evidence shows that in submitting comments to the CIR, Mr. Kelly of the CRE claimed that *"The Center for Regulatory Effectiveness is not representing a particular company or industry segment in filing these comments [,]"* even though he was working for Imerys at the time (IMERYS 062429). Then, before the review even began, he commented that CRE had established a *"strong relationship with the Cosmetic Ingredient Review."* (IMERYS 226115). Monice Fiume of the CIR staff told Mr. Kelly in 2011, before the review began, *"that CIR would welcome any input from industry on the review at any time."* (IMERYS 065205). Further evidence shows that CIR staff and not the expert panel itself, wrote the talc safety assessment report, and then provided the expert panel with that review as well as comments on the document that had only been made by industry or by consultants to industry (PCPC0004567; IMERYS14817; IMERYS118788; IMERYS065205; IMERYS315001; IMERYS320614; IMERYS281536; IMERYS283501; IMERYS322846; IMERYS298968).

100. It is my opinion as well that information contained in other industry documents, reveal industry efforts to influence scientists and regulators making decisions about talc and its human health risks, were not limited to interactions with the NTP, the FDA and the IARC panel (JNJ000024397; JNJ000379382-384; IMERYS-A_0005090; JNJ000003405; JNJ000381275-276; P-0021; P-0030; P-0031).

## VIII. Talc's Human Health Risks and Regulatory Concerns

101. A review of scientific literature and internal company documents from Imerys, Johnson & Johnson, and PCPC shows that the defendants were aware of the human health hazards associated with talc powder products for many decades. Given the presence of asbestos, fibrous

talc, nickel, chromium, and cobalt in the talc body powders manufactured by Imerys and Johnson & Johnson, it is my opinion that a significant human health risk was identified as a hazard related to talcum powder products use at least by the 1940's. These risks included a risk of cancer with exposure to constituents of talcum powder products, and even death with acute inhalation of large amounts of the powder. The following chronology supports my opinions that there is adequate evidence that talcum powder product use is hazard to human health.

- By 1940, the scientific literature contained studies showing that mineral dust exposure, including exposure to talc and asbestos, was associated with lung diseases that could be fatal, and that talc used to manufacture body powders contained both platy talc and fibrous components, including tremolite. Studies by Johnson & Johnson scientists themselves in the 1940's had identified talc as a hazard to human health (Eberl *et al.* 1948).
- By 1950, the scientific literature contained studies showing that talc was associated with adverse tissue reactions in both humans and animals, that the fibrous component of talc was of concern, that exposure to talc in the cosmetic industry itself could produce lung disease, that lung disease due to talc and asbestos was similar, that tremolite dust was an industrial hazard in terms of lung disease, and that even small doses of talc from surgical gloves was linked with adverse tissue reactions, even being described as *"a serious menace in surgery"* (Saxen and Tuovinen, 1947) and as posing a "grave danger" (Eberl *et al.* 1948).
- By 1952, Johnson & Johnson was aware of the adverse tissue reactions linked to talc powders, including the dangers of inhalation of talc (U.S. Patent 2,626,257), even filing a patent for a replacement for talc as a medical dusting powder.
- By 1954, the scientific literature included a report of death in a 10-month old infant due to asphyxiation after aspiration of a large amount of baby powder. It should be noted that reports of such deaths and serious injuries in children continued to occur into the 1960's and 1970's, with one physician suggesting in 1969 the following: *"The widespread ignorance of the dangers of talc aspiration is not surprising, and it is my opinion that these dangers should be better publicized. The direct means of accomplishing this would be a warning statement on each container."* (Moss, M.H. 1969).
- By the mid 1950's, the majority of scientists believed that asbestos could cause lung cancer, and likely other forms of cancer, in humans (Doll, 1955). Evidence for a link of asbestos exposure with lung disease, including lung cancer, was available by the 1930's.

- By the 1950's the scientific literature indicated that asbestos was present in talc, including milled powders (*e.g.,* Dreessen and Dalla Valle, 1935; Millman, N. 1947; Hogue and Mallette, 1949; Schepers and Durkan, 1955). Evidence shows that even today, talcum powder products, including products manufactured and sold by Imerys and Johnson & Johnson included asbestos, fibrous talc, nickel, chromium and cobalt.
- In 1960, the scientific literature included a paper describing the link of ovarian cancer with asbestos exposure (Keal, E.E. 1960). Given that it was known that asbestos was present in talc powder, this paper provided notice that the talcum powder products sold by Johnson & Johnson posed a risk for ovarian cancer as well as lung cancer. Further support for the association of ovarian cancer with exposure to asbestos also was provided in the 1960's (Graham and Graham, 1967).

102. Based on the knowledge available by the 1950's, it is my opinion that talcum powder products manufactured and sold by Imerys and Johnson & Johnson should have warned consumers about the toxic constituents, such as asbestos, fibrous talc, cobalt, nickel, and chromium, in their products and the effects that could be produced by exposure to talc dusts. It is noted that in the 1953 Johnson & Johnson patent, U.S. Patent No. 2,626,257 (filed May 21, 1952), statements warning of adverse human health effects are provided including the following statement: *"Even persons who were not subjected to internal application of talcum have suffered severely from it. Talcum in the respiratory tract is dangerous and has caused severe breathing difficulties to infants, hospital patients and nurses when used carelessly and/or permitted to contaminate the air in large amounts."* Although these statements were made in the patent documents, which may have been seen by lawyers and others involved in intellectual property evaluations, no warnings related to any adverse effect of talcum powder products was made available to the scientific and medical community, regulators, and consumers through statements on packaging of Johnson & Johnson talcum powder products until the 1980's (JNJ000450199-205). Even today, despite the large body of data that has accumulated since the 1950's linking talcum body powder exposure with a risk of cancer, Johnson & Johnson talcum powder products fail to warn consumers about the risks of cancer linked to talc exposure.

103. The issue of safety concerns related to talcum powder products and the failure of companies to warn consumers about serious adverse health effects is of particular importance in the case of a cosmetic product, such as Johnson's Baby Powder, Shower-To-Shower and Shimmer. This is due to the regulatory process in place in the United States related to cosmetics. As discussed above, and unlike the regulation of drugs, devices, and food additives, the responsibility for safety assessment of cosmetic ingredients and products is the responsibility of the cosmetic ingredient and product manufacturers, not the FDA. Cosmetics do not undergo any premarket approval process at FDA. As a result, it is the cosmetic manufacturer, and/or the cosmetic ingredient manufacturer, that is responsible for assuring that the products sold to the consumers, and the ingredients in those products, are safe for use (*Federal Register* 40(42) March 3, 1975). Moreover, there is no benefit assessment made for cosmetic products. In 1966, Johnson & Johnson was aware that their products were considered to have no health benefit (JNJNL61_000039194). This is consistent with the cosmetic regulatory paradigm that is only based on weighing risks of ingredients and products, not benefits.

104. Manufacturers of cosmetic ingredients and finished cosmetic products have a responsibility to continually monitor the scientific information that develops over time to determine if the risks associated with an ingredient, and/or a product, changes due to things such as previously unknown information, development of additional supporting information that may alter the existing safety profile of a product, and even identification of unanticipated safety concerns that can arise with real world use of products. In other words, the responsibility of the manufacturer does not end once an initial safety determination has been made.

105. As already discussed, the regulation is as follows (21 CFR 740.1(a)): *"The label of a cosmetic product* ***shall bear a warning statement*** *whenever necessary or appropriate* ***to prevent a health hazard that may be associated with the product****."* This statement means that the standard that must be met when deciding whether to add a warning to the label of a cosmetic warning is whether there is a possibility of a health hazard and that it could be prevented. In the current case, that "possibility" is of cancer occurring in humans using the body powders for genital dusting. The prevention issue would be related to warning consumers not to use the powders for genital dusting. As discussed in detail above, based on the available scientific data as well as my

education, training, and experience, it is my opinion to a reasonable degree of scientific certainty that Imerys and Johnson & Johnson should have initiated actions to add a warning to the labeling of talcum powder products at least by the 1950's that described the adverse health effects linked to talc body powder exposure. Specifically, a warning about serious tissue toxicity and the increased risk of ovarian cancer with use of talcum powder products should have been included on the product labeling.

106. In order to add warnings to a product, the company must be aware of the risk, which is why I have outlined what was known and when it was known (discussed above in detail). A review of internal company documents, documents from Johnson & Johnson, Imerys, and the PCPC shows that talc ingredient manufacturers and the manufacturers of talcum powder products were following the published literature and were also intimately involved in the safety assessments of talc over the years (*e.g.*, IMERYS 052752 through 754; P-81; see Shripal Sharma deposition dated 9/26/2012; see John Hopkins depositions dated 10/26/2012, 8/16/2018 and 8/17/2018; and see depositions of Dr. Linda Loretz). Thus, the defendants were at least aware for decades that ovarian cancer *may* be associated with the use of talcum powder products.

107. It is important to note that Johnson & Johnson has undertaken efforts to improve the safety of its products used on babies, which would include its talcum powder products. In 2012, Johnson & Johnson made the decision to remove certain harmful chemicals from its baby products including the IARC Group 2B carcinogen triclosan (see *e.g.*, P-38). This action is in conflict with the company's position on talc, also an IARC 2B carcinogen, where Johnson & Johnson did not include a warning to consumers about the risks associated with genital talc use. Then, in 2018, Johnson and Johnson initiated actions to overhaul its baby product line to be more "natural," by removing artificial ingredients and becoming more transparent in terms of the actual ingredients in its products, including Johnson's Baby Powder. These actions have not led to removal of talc, or other constituents of its body powder, from its products and their products still fail to provide a warning to consumers about the cancer risk associated with talcum powder products. Instead, by using the word "natural" the companies are now suggesting an improved safety profile despite no substantive changes in the risks linked with the product.

108. Another action that Johnson & Johnson has taken is developing an alternative line of body powders based on the use of cornstarch instead of talc. Johnson & Johnson investigated an alternative body powder product based on cornstarch instead of talc as early as the 1960's (JNJ000265536-538; see Cornstarch Fact Book JNJTALC000864509). Johnson & Johnson filed a patent in 1952 that issued in 1953 for medical dusting powders that were cornstarch-based powders and in that patent identified the significant toxicity associated with talc powders (U.S. Patent 2,626, 257). The text of the patent describes the toxicity of talc in tissue as a reason for finding a replacement. On February 21, 1964, a Johnson & Johnson Memo regarding cornstarch development states, *"…**it replaced talc because it was found to be absorbed safely in the vagina whereas, of course, talc was not**." [**emphasis** added]* (JNJ000265536-265538) Throughout the 1960's and 1970's, Johnson & Johnson continued to develop cornstarch as a body powder product (*e,g.,* JNJ000265482-483; JNJ000253830-832; JNJ000245901-903; JNJ000245744-748; JNJ000244094-095; JNJ000526750; JNJ000404860; JNJ000279507; JNJ000245762; JNJ000011150; JNJ000026987; JNJ000245678; JNJTALC000866104; JNJ00006987-7007). Important in this process was the fact that the company performed test marketing of a cornstarch Johnson's Baby Powder product in 1977 and found that the cornstarch product *"has been accepted by the consumer as a formula replacement"* (JNJ000245679). In 1978, the FDA's OTC Monograph for skin protectant products (*i.e.,* body powders) listed cornstarch as Generally Recognized as Safe and Effective (GRASE) for use in OTC products (JNJ000470844-846; JNJ000348778) and even noted that cornstarch was recognized as being superior to talc in terms of safety and efficacy (JNJ000470846; JNJ000019415). Therefore, at least by the 1970's, Johnson & Johnson had identified a replacement ingredient for its talcum powder products that they knew was safe and provided the desired cosmetic properties. With respect to the issue of talc as compared to cornstarch powders and ovarian cancer risk, one study has reported that cornstarch is "not predicted to be a risk factor for ovarian cancer" (Whysner and Mohan, 2000). With respect to alternative talcum powder products, Imerys has begun work to produce a synthetic talc powder product (Claverie *et al.* 2018; Imerys 2017-2018 Annual Report); such synthetic talc powder should be able to be produced such that it would be free of constituents such as fibrous talc, asbestos, and heavy metals.

109. With respect to Imerys specifically and this issue of warning consumers about risks linked to products, in another internal document (IMERYS 284935 through 937), the importance of the public safety issues surrounding talc, and women's health in particular, were acknowledged by industry. Documents support my opinion that industry was aware of the need to warn consumers of the cancer risk issue in 2006 (P-0033). Yet, no actions were taken to inform the consumer about the risks associated with talc products. Evidence shows that Imerys began drafting a proposal to FDA wherein industry suggests voluntarily phasing out the production and sale of all cosmetic talc products used for consumer dusting powders that could reasonably be anticipated to be used by women for perineal applications and also to assist the FDA in developing a warning label for body powders containing talc that would warn of the danger of genital dusting (IMERYS 284935 through 937 (P-341)) Importantly, no withdrawal has occurred to date, and there is no warning statement on Johnson & Johnson talcum powder products that refers to the risk of cancer of any type, including ovarian cancer with genital dusting.

110. Johnson & Johnson has never placed a warning on its talcum powder products in order to inform consumers about the serious health risks associated with use of their products. The labeling is, and was, inadequate to inform consumers about the risks associated with use of its products, including the risk of cancer. Given that MSDS sheets are not supplied to consumers of talcum powder products, Imerys also failed to ensure that consumers were warned of the risk of cancer associated with genital talc use (IMERYS328096). Placing a warning on the talcum powder product labels would be an important step towards informing consumers of the hazard associated with repeated use of the products for genital dusting.

111. In a survey of the commercial market over the last year, I identified several talcum body powder products that have included a consumer warning about an increased risk of cancer. Attached in Appendix E to this report is a series of photographs of bottles of body powder that contain such warnings. For example, some of these products state on the labeling: "*Frequent application of talcum powder in the female genital area may increase the risk of ovarian cancer*". This is an example of a warning being placed consistent with 21 CFR 740.1(a).

112. Evidence from other internal corporate documents support my opinions that the defendants were aware that talcum powder products may be associated with a health hazard, which would require a warning on defendants' products. Examples include:

- a 1986 Johnson & Johnson "Technological Forecast" document (P-9) where the company admits that there are continuing health concerns with talc and the safety of cosmetic powders, and that the powders have no health benefit;
- a Johnson & Johnson document dated August 5, 1992 (P-10) discussing declining sales of Baby Powder, including talcum powder products, and the company's desire to grow the powder franchise by targeting minority populations of women (This is a concern given that the same document acknowledges the link of the products with cancer);
- a document from 1997 written by Johnson & Johnson's own toxicology consultant, Dr. Alfred Wehner, where he informed the company about false public statements being made by the PCPC regarding talc safety (P-20); Johnson & Johnson did nothing to correct the false impression left by the PCPC's statements);
- a 1997 document where Johnson & Johnson downplayed the health risks of talc when it responded to media questions about its products (P-115), and failing to acknowledge the role that industry played in the 1994 evaluation by FDA and the fact that reliable scientific evidence had raised a signal for cancer risk;
- a 2000 document from Imerys files where their results from a marketing survey showed the company that "*the general public is not aware of any health issues regarding talc*" (P-24);
- a 2000 internal Imerys email whereby Richard Zazenski agrees with the NTP reviewers that the epidemiology studies are concerning and the data is not dismissible. He may even agree with adding warning labels (IMERYS 240341).
- a 2000 memorandum prepared by Burson-Marsteller for Johnson & Johnson announcing the intent to only use cornstarch beginning December 1, 2000 and discontinuing the use of talc in all consumer products (JNJ000404424 and JNJ000404425);
- a 2001 presentation by Steve Jarvis of Imerys acknowledges that realistically "*there are some health issues with talc*" based on finding for 20 years a "*persistent*

*statistical link between the hygienic use of talc and ovarian cancer*" (IMERYS 178944);

- a 2008 email from Todd True, former Global Creative Director for Johnson & Johnson says, "*The reality that **talc is unsafe** for use on/around babies is disturbing. I don't mind selling talc, I just don't think we can continue to call it Baby Powder and keep it in the baby aisle.*" Fred Koberna, another Johnson & Johnson employee, responds, "*My understanding is that we introduced the cornstarch variant as an alternative to talc for use on babies. Due to the talc issue and some doctors recommending for moms not use powder on their babies, we don't promote powder to moms.*" Mr. True responded, "*I am on a bit of a mission to strongly consider removing talc from the baby aisle.*" (JNJ000457161) *[**emphasis** added]*
- a 2009 memo by Imerys criticizing Johnson & Johnson for preferring to purchase talc based on cost rather than quality (P-560); and
- two documents related to Johnson & Johnson's pharmacovigilance assessments in 2012 through 2014 (P-882 and P-883) where employees had determined a causal connection between talc body powder use and certain cases of ovarian cancer reported to the company, but the decision was made to remove the language about causality from the records for those cases.

113. Documents in company files also reveal that in November 1994, Johnson & Johnson received a letter from Dr. Samuel Epstein, chairman of the group known as the Cancer Prevention Coalition (P-18), notifying the CEO of Johnson & Johnson of the filing of the Citizens' Petition. In that letter, Dr. Epstein requested that talc products be withdrawn from the market due to the concern with human cancer, or that, at least, a label warning should be required for consumers regarding the concerns of ovarian cancer with talc use. On behalf of industry, PCPC filed comments in 2009. Although industry disagreed with Dr. Epstein's position, it agreed that reasonable scientists looking at the data could disagree with industry, that this disagreement was one that was expressed by responsible scientists over decades, and that defendants could voluntarily change the label without being required to do so by the FDA. Yet, Johnson & Johnson did not warn about the risk of cancer following receipt of their letter. Given the expertise of Dr.

Epstein and the fact that he was pointing to reliable scientific information to support his concerns, Johnson & Johnson had a duty to inform consumers of the potential risks associated with talc use, particularly in women using body powders for genital application.

114. Other industry actions related to talc and the safe use of talc powders in humans that inform my opinions and warrant discussion include the removal of talc powder as a lubricant for condoms and for surgical gloves. With respect to use of talc powder on condoms, manufacturers decided in 1996 to no longer use talc on condoms (IMERYS-A_0011817; January 16, 1996 article in Asbury Park Press; P-0019). The decision was driven in part by the opinions expressed by scientists in the published literature concerning the health hazards associated with talc (Kang et al. 1992; Kasper and Chandler, 1995). Talc industry members such as Johnson & Johnson, Imerys and the PCPC were aware of these actions (PCPC_MDL00062175; PCPC0075758). With respect to use of talc powders on surgical gloves, the risks to human health had been recognized in the 1950's (discussed above). In 2016, FDA acted to formally ban use of powders, including talc, on surgical gloves (*Federal Register* December 16, 2016).

115. Documents show that, instead of providing consumers with warnings and safety information regarding use of talcum powder products, industry performed marketing research (*e.g.*, PCPC0077761-77926; P-24). From the results of the market research, industry knew that consumers were unaware of the safety concerns associated with use of talc-based body powders in the genital area. Importantly, during the process of collecting the consumer data, consumers participating were told that the information on the link of talc use with cancer was "hypothetical", even though industry was aware of a wide variety of scientific data where well-respected scientists had concluded that talc posed a cancer hazard to humans. Evidence shows industry also marketed talcum body powders by targeting populations with a known propensity to use talc body powders in the genital area (P-10; P-0374; P-771).

116. Documents show that Defendants recognized the health hazard of talcum powder products and the potential consequences of failing to inform the scientific and medical community, regulators, and consumers of those hazards (P-26; P-27; P-66). They even developed a document

discussing questioning around the safety issue. The document shows that industry understood that data existed supporting the safety concerns.

## IX. Conclusions

117. In conclusion, based on my training and experience in pharmacology, toxicology, pharmacokinetics, human health risk assessment, and the regulation of cosmetic products in the United States, it is my opinion to a reasonable degree of scientific certainty that the weight-of-the-evidence indicates that genital exposure to talcum powder products increases the risk of ovarian cancer in women. This conclusion is supported by data that includes, but is not limited to the following: (1) the known toxic effects of talc and the other components of talcum powder products; (2) studies that have identified biologically plausible mechanisms for cancer in humans; (3) the likelihood that talc particles can reach the ovaries; (4) the existence of a dose-response relationship for toxicity including the risk of cancer; and (5) the large human database that includes studies conducted over a period of 40 years showing a consistent signal for ovarian cancer in women exposed to talcum powder products.

118. It is also my opinion to a reasonable degree of scientific certainty that the use of talc in cosmetic products does not meet the CIR standard of safety. Given the presence of asbestos, fibrous talc, cobalt, chromium, and nickel, in the talc body powders manufactured by Imerys and Johnson & Johnson, a significant biologically plausible human health risk was identified as a hazard related to talc body powder use at least by the 1940's. These risks included a risk of cancer with exposure to constituents of talc body powders, and even death with acute inhalation of large amounts of the powder. Based on the knowledge available by the 1950's, talc body powders manufactured and sold by Imerys and Johnson & Johnson should have warned consumers about the toxic constituents, such as asbestos, fibrous talc, nickel, chromium and cobalt and fragrance, in their products and the effects that could be produced by exposure to talc dusts. There was evidence from at least the 1960's of the risk of ovarian cancer in women exposed to components of talc body powders, evidence that only gained strength over the last 30 years. The CIR standard states that there is "no evidence" that demonstrates grounds to suspect a hazard to the public under conditions of use. Based upon my review of the scientific evidence, it is my opinion within a reasonable degree of scientific certainty that talc-based cosmetic products, including products used

by women for genital dusting, should have been labeled to warn of the risk of ovarian cancer with such use. This specific ovarian cancer risk was evident by the 1960's given the presence of asbestos in talc body powders. This opinion is based on the FDA regulations that state that *"the label of a cosmetic product shall bear a warning statement whenever necessary or appropriate to prevent a health hazard that may be associated with the product"* (21 CFR 740.1(a)). Cause and effect do not have to be proven for such a warning to be put into place. Given that there has never been an adequate warning placed onto the containers of talcum powder products, the failure to provide consumers with such information puts public health at risk.

119. Finally, it is my opinion to a reasonable degree of scientific certainty that industry worked together with the PCPC to influence the scientific and regulatory processes related to cosmetic talcum powder products such that the scientific and medical communities, as well as consumers, were not provided with important safety information about use of the products.

120. I hereby certify that this report is a complete and accurate statement of all my opinions, and the basis and reasons for them, to which I will testify under oath.

## X. Compensation

121. My compensation for litigation work, for both defense attorneys and plaintiff attorneys, is at the rate of $300.00 per hour.

# APPENDIX E

## Photographs of Body Powder Products and Their Warnings


CLINICALLY PROVEN
mildness
Johnson's
baby
powder
talco para bebés
keeps skin comfortable, dry & feeling soft all day
no parabens, phthalates or dyes
Johnson & Johnson
22 OZ (623g)
30039151


For over 125 years JOHNSON'S® formulas have been specially designed for baby's unique and delicate skin. Great for kids and adults too!
Hypoallergenic & tested with dermatologists
TO USE:
1. Shake powder directly into your hand, away from the face, before smoothing onto the skin.
2. Close tightly after use, store in a cool, dry place.
PARA USAR:
1. Antes de aplicarlo sobre la piel, agitar el polvo directamente en la mano, lejos de la cara.
2. Cerrar bien después de usar, y guardar en un lugar fresco y seco.
Every JOHNSON'S® product is designed to meet or exceed the top internationally recognized regulatory standards. Learn more at www.johnsonsbaby.com.
INGREDIENTS: Talc*, Fragrance
*naturally-derived ingredients
WARNING: Keep powder away from child's face to avoid inhalation, which can cause breathing problems. Avoid contact with eyes. For external use only. Close tightly after use. Keep out of reach of children. Do not use if quality seal is broken.
ADVERTENCIA: Mantener el talco alejado de la cara del niño para evitar la inhalación, que podría causar problemas respiratorios. Evitar el contacto con los ojos. Para uso externo exclusivamente. Cerrar bien después de usar. Mantener fuera del alcance de los niños. No usar si el sello de seguridad está roto.
Questions? 866-JNJ-BABY;
Outside US, dial collect 215-273-8755.
¿Preguntas? 866-JNJ-BABY;
Fuera de los EE. UU., llamada de cobro revertido al 215-273-8755.
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Talc Made in China
Talco hecho en China
Care To Recycle™ our babies will inherit our planet®
30039152
3 81370 03014 0


Angel of mine™
Baby Powder
• Fresh, Clean & Soft
NET WT. 14 OZ (397 g)
LOT#19009W
Angel of mine™
ANGEL OF MINE™ Baby Powder is especially formulated to soothe and give a fresh, clean and fragrant feeling to your baby's delicate skin. Made of the finest talc, it helps to absorb excess moisture, keeping the baby's skin dry and soft for ultimate comfort.
Directions: After changing diapers and after every bath, dry baby's skin thoroughly and apply liberally as needed.
Ingredients: Talc and Fragrance.
Warnings: • Keep out of reach of children. • For external use only. • Avoid contact with eyes, discontinue use if irritation persists. • Avoid ingestion or accidental inhalation by baby. This product contains talcum powder and is intended for external use only. Frequent application of talcum powder in the female genital area may increase the risk of ovarian cancer. Seek professional assistance if needed.
This product is sold by weight, not volume. Settling will occur during handling & shipping.
7 81072 01021 9
983408 DISTRIBUTED BY GREENBRIER INTERNATIONAL, INC. 500 VOLVO PARKWAY, CHESAPEAKE, VA 23320 MADE IN U.S.A.


18101 072
ASSURED
Shower & Bath
Absorbent Body Powder
with Lavender
Compare to Shower to Shower®
NET WT 13oz (368 g)
ASSURED
Assured's Shower & Bath Absorbent Body Powder is specially made with cornstarch for greater absorbancy and baking soda to help neutralize odor. This Shower & Bath product is uniquely formulated to help you feel cool and confident all day.
CAUTION: Discontinue use if rash or irritation develops. Do not apply to broken or irritated skin.
WARNING: This product contains talcum powder and is intended for external use only. Frequent application of talcum powder in the female genital area may increase the risk of ovarian cancer.
KEEP OUT OF REACH OF CHILDREN
INGREDIENTS: Talc, Cornstarch, Sodium Bicarbonate, Fragrance, Tricalcium Phosphate, Polysaccharides, Aloe Barbadensis Extract, Chamomile (Anthemis Nobilis) Extract.
*This product is not manufactured or distributed by Johnson & Johnson, owner of the registered trademark Shower to Shower®
DISTRIBUTED BY
GREENBRIER INTERNATIONAL, INC.
CHESAPEAKE, VA. 23320
PRODUCT OF USA
6 39277 17468 0


Spring Fresh®
Poudre Powder Talco
Tranquil Breeze
Brise fraîche Brisa fresca
NET WT 5.0 OZ
140 g


INGREDIENTS: TALC, FRAGRANCE (PARFUM), BENZYL BENZOATE, BENZYL CINNAMATE, BENZYL SALICYLATE, CITRONELLOL, EUGENOL, ALPHA-ISOMETHYL IONONE, HEXYL CINNAMAL, HYDROXYISOHEXYL 3-CYCLOHEXENE CARBOXALDEHYDE, HYDROXYCITRONELLAL, BUTYLPHENYL METHYLPROPIONAL, LIMONENE, LINALOOL.
INGREDIENTES: TALCO, FRAGANCIA, BENZOATO DE BENCILO, CINAMATO DE BENCILO, SALICILATO DE BENCILO, CITRONELOL, EUGENOL, ALFA-ISOMETIL IONONE, HEXIL CINNAMAL, HIDROXI-ISOHEXIL 3-CICLOHEXENO CARBALDEHÍDO, HIDROXICITRONELAL, BUTILFENIL METILPROPIONAL, LIMONENO, LINALOOL.
Caution: For adult use only. Keep out of reach of children. If the product enters the eye, wash out thoroughly with plenty of clean water. Keep powder away from children's nose and mouth. Medical evidence suggests that women who use talcum powder as a feminine hygiene product run a greater risk of developing ovarian cancer.
Mise en garde: Pour adultes seulement. Garder hors de la portée des enfants. Si le produit entre en contact avec les yeux, rincer abondamment à grande eau. Garder la poudre loin du nez et de la bouche des enfants. Les preuves médicales suggèrent fortement que les femmes utilisant la poudre de talc comme produit d'hygiène féminine courent un plus grand risque de développer un cancer de l'ovaire.
Precaución: Solo para uso en adultos. Mantén este producto fuera del alcance de los niños. Si el producto entra en contacto con los ojos, enjuágatelos con abundante agua limpia. Mantén el polvo alejado de la nariz y la boca de los ninõs. La evidencia médica sugiere que las mujeres que usan talco como producto de higiene femenina tienen un riesgo mayor de desarrollar cáncer ovárico.
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equate™
Compare to Dr. Scholl's® Soothing Foot Powder*
Soothing Foot Powder
• Helps cool feet
• Absorbs excess moisture
• Helps control foot odor
Made in the USA
Factory Certified
NET WT 7 OZ (198 g)


Equate™ Soothing Foot Powder
refreshes your feet.
• Highly absorbent formula helps keep feet dry and comfortable
• Cooling ingredient soothes and refreshes
• Regular use helps control foot odor
Ingredients
Talc, salicylic acid, methyl salicylate
Directions
• Sprinkle generously on all areas of the feet.
• Not intended for genital area.
Warnings
For external use only.
Keep out of reach of children.
If swallowed, get medical help or contact a Poison Control Center right away.
Other information
• Bottle contains the proper weight.
• Contents may settle during shipping.
Questions?
Call: 1-888-287-1915

# EXHIBIT E

# UNIVERSITY OF MINNESOTA
# SPACE SCIENCE CENTER

# INVESTIGATION OF POSSIBLE ASBESTOS CONTAMINATIONS IN TALC SAMPLES

## SCANNING ELECTRON MICROSCOPE EXAMINATION

Specimens of powdered talc were received from Johnson & Johnson Co. and from McCrone Associates. Analysis of these samples using the scanning electron microscope was requested in order to determine the possible content of fibrous crysotile asbestos contained in the talc samples. The first lot of material examined was labeled by McCrone Associates Lewin.

The samples were mounted on one half inch aluminum electron microscope stubs with silverprint glue. The glue was first placed on the aluminum stub and the sample was then pressed to the surface of the wet silver print. A jet of pure Freon was used to remove excess talc from the surface. The specimens were then shadowed with a thin layer of carbon and gold providing a conductive path to the specimen stub. The stubs thus prepared were placed in the scanning electron microscope which was operated at 20 kilovolts electron beam energy and were examined at magnifications between 20 and 25,000 times. The initial effort was directed toward detection of the presence of fibrous morphologies in the basically sheet structured talc bodies. To this end crysotile asbestos specimens were prepared as outlined above and observed in the S.E.M. as illustrated in Figure 1.

To be noted, of course, is the highly fibrous structure as opposed to the layered structure of the talc bodies. The asbestos fiber can be seen to shred both at the ends and on occasion at the center of a fiber bundle giving an appearance not unlike rope but on a much magnified scale.

Having established the general appearance of asbestos, suitable samples were selected for examination in a scanning electron microscope. A magnification of 1,000 times seems quite adequate to pick up any appreciable fibrous morphology present within the talc sample. In order to make the survey as quantitative as possible, a grid of pictures was mapped on the surface consisting of five pictures on each side of

a square covering thus 25 squares at 1,000 times magnification. Numerous fibrous structures were observed during this examination of both the original Lewin material and the Shower to Shower material supplied by Johnson & Johnson. Examples of these micrographs are shown in the following figures. Figure 2 shows one such fibrous material which is in fact split on the end and is generally within the limits of possible diameter of an asbestos fiber. The general character of the split at the end, however, rather than being shredded, gives a somewhat more solid appearance indicative of an organic fiber such as wood. Figure 3 shows an area at the center which may possibly indicate an asbestos structure. Slight differences in character, however, exist. Although the rough appearance of this body is shredded, careful examination indicates that it is more than likely an edge on view of a talc structure.

Figure 4 shows another such structure. In addition, however, at the center of the micrograph indicated by the arrow, is a small broken fiber which is too small to identify for certain as either talc or asbestos. Other such examples are seen in Figures 5 and 6. These may probably be discounted on the basis of their very short length. One such fiber which is sufficiently long to be suspect is seen in Figure 7, taken at 500 times magnification. These are, however, seldom encountered. Figure 8 and 9 show higher magnification pictures of such fibers taken at 5,000 and 10,000 times respectively. These cannot be entirely discounted although the net volume involved, even if they are asbestos fibers, is extremely small.

Figure 11 shows an example in the lower right hand corner of a fiber which is almost certainly wood. Asbestos cannot possible take such a small radius of curvature without being entirely shredded. One rather curious fiber found during this investigation is shown in Figure 12. It is roughly the proper size and length but shows a most curious end structure. This is more than likely a talc body which has encountered an on endcollision and become shredded during its processing. No evidence of microstructure indicative of asbestos was found.

CHEMICAL EXAMINATION OF FIBERS

Considering that little could be categorically determined to be asbestos in the material based solely upon morphology, efforts were made to use microchemical analyses of such fibers in the scanning electron microscope. These efforts involve the use of a non-dispersive X-ray detector, which analyzes the X-rays energy resulting from electron beam impingment. Areas as small as a 1,000 Angstrom fiber can be analyzed under suitable conditions. Figure 15 and 16 show traces of an oscilloscope picture in which the energy of X-rays is displayed along the horizontal scale and the number of X-rays arriving at the counting detector is displayed on the vertical scale. In Figure 15 an asbestos fiber was used as an object for X-ray analysis by reducing the electron scan image to a line which was aligned along the asbestos fiber. The asbestos fiber was imbedded in the talc matrix and was in fact part of the doped specimen. A number of elements can be identified from this trace. The ones which are certain to be part of the specimen itself rather than artifacts of the instrument are magnesium and silicon. This pattern was used as a standard and compared to other counts taken from suspect fibers in other fields of view. Efforts were made to maintain the geometry the same as that in the standard. An example of such an effort is seen in Figure 16. No strong similarities could, however, be shown in any fiber sample.

TRANSMISSION ELECTRON MICROSCOPY

Considering the lack of success in obtaining definitive results by scanning electron microscopy transmission electron microscopy was tried. Specimens were mounted by standard techniques of swirl dispersion on electron microscope grids covered with a formvar film. A large number of grids were examined and numerous examples of fibrous material were seen. Of the large number of grids examined, three examples of fibers which upon examination by electron diffraction could be classified as likely candidates for crysotile asbestos in the shower to shower material and one example was found in the Lewin material. These are shown in Figure 16, 17, 18

and 19. In Figures 17a and 18a, electron micrographs of the transmission type show the typical stranded appearance of crysotile asbestos. In each case, Figures 16 through 19, the diffraction pattern is closely similar to that indexed for crysotile asbestos. Figure 18a is a double exposure of the diffraction pattern and the bright field micrograph. In order to avoid confusion as to the area used in diffraction, the bright spot at the center of the micrograph is a delineation of the area used in diffraction. The diffraction pattern, however, is rotated by roughly 40° from the axis of the specimen. It is felt therefore that crysotile asbestos does exist in the specimens of shower to shower and Lewin supplied to this laboratory. It is, however, further concluded that, on the basis of samples supplied to us, transmission electron microscopy can only find a total material by volume of less than 1/100 of 1 percent crysotile asbestos in the shower to shower material and less in the Lewin material.

CONCLUSIONS

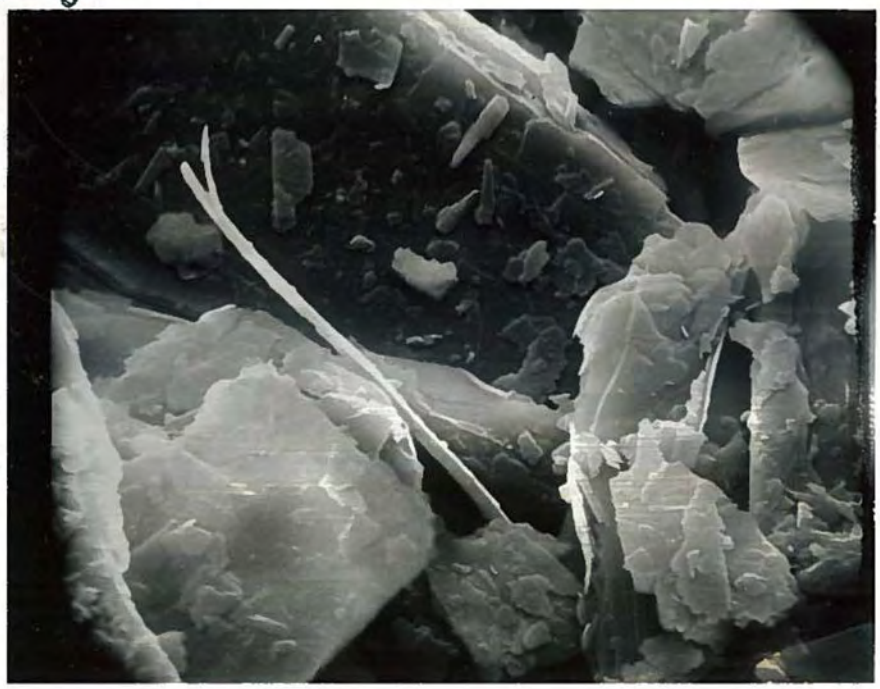
The extensive investigation reported here must conclude that the scanning electron microscope by itself is unable to make distinctions between asbestos fibers within samples of talc and other such fibers of wood, wool, and talc fibers. Only the shredded appearance (not found in any specimen examined other than that purposely doped with asbestos) is the sole basis for assuming the existence of asbestos in the specimens. Efforts to use non-dispersive X-ray detection yielded a negative result, and could not be used as well. Transmission electron microscopy shows less than 1/100th of 1 percent asbestos in the material given to us. Neither scanning microscopy alone or in conjunction with microchemical analysis can be reasonably expected to prove the existence of crysotile asbestos in talc.

Fig 1

AI 500X

Figure 2

9-14-5 1A



5,000X

2-1

Figure 3

9-13-4-C

1,000 X

Figure 4

9-14-1-A

1,000X

S to S

Figure 5

9-142B

1,000 X

S to S

Figure 6-A

9-14-4A

1000X

S-to S

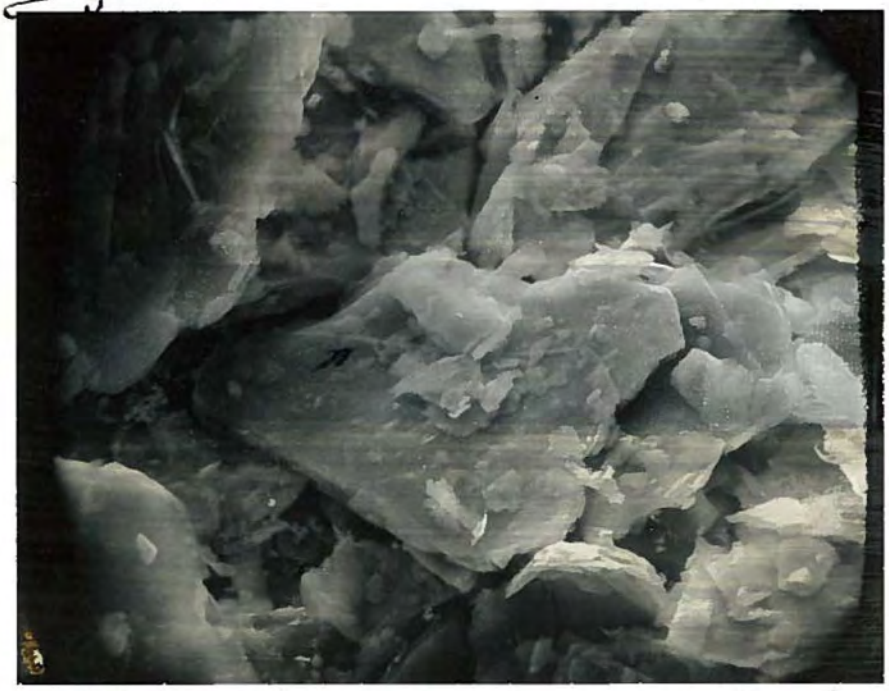
Figure 6-B

9-14-27A

1,000 X

S to S

Figure 1

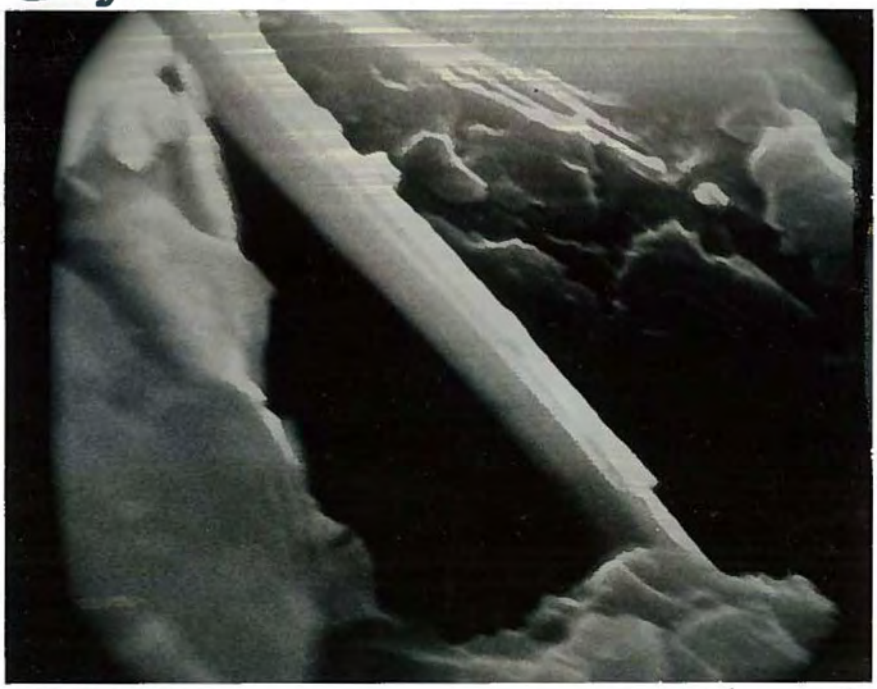


T4 500X

Figure 8

JH 5K #3

Figure 9



10KX 9-44 #3

Figure 11

9-14-54A

1,000X

L-1

Figure 12

5K T6 Count 2

Figure 13

12KX 1% doped Jef.

Figure 14

1% doped 1000X

Figure 15-a

As fiber

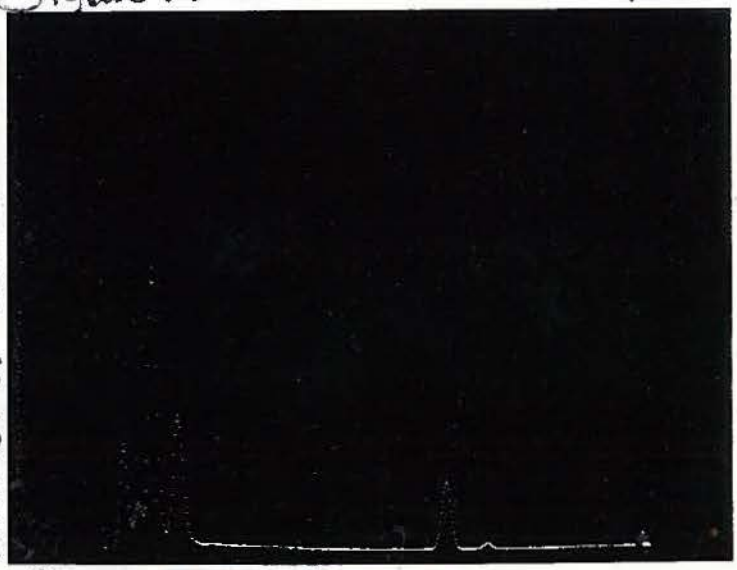
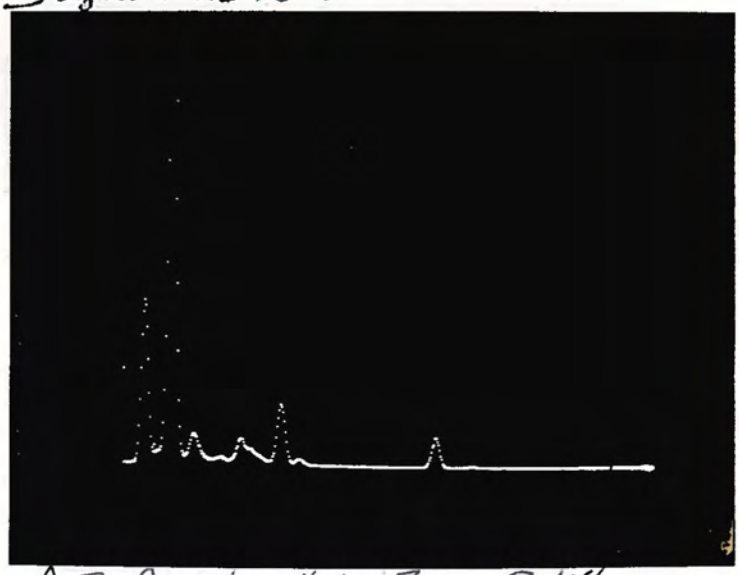


Figure ~~Eo~~ 15-b

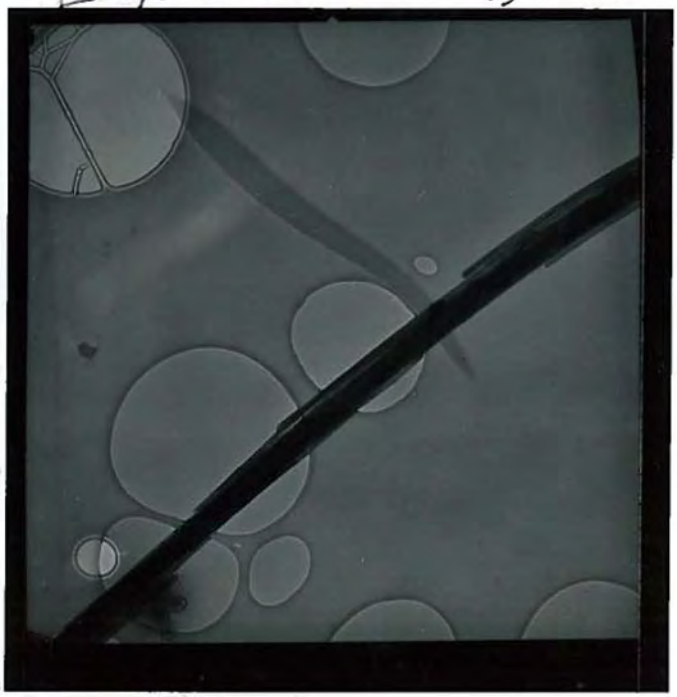


A-3 Count #10-31 3X10⁴

Figure 46

S to S 1
Grid 52

Figure 17-a ¥,800X



5 to 5 3
Grid 32

Figure 17b

Sto 1
Grid 57

Figure 18-a 4,800X

5x5 3
Brick
note diff. Pat dbl ex.

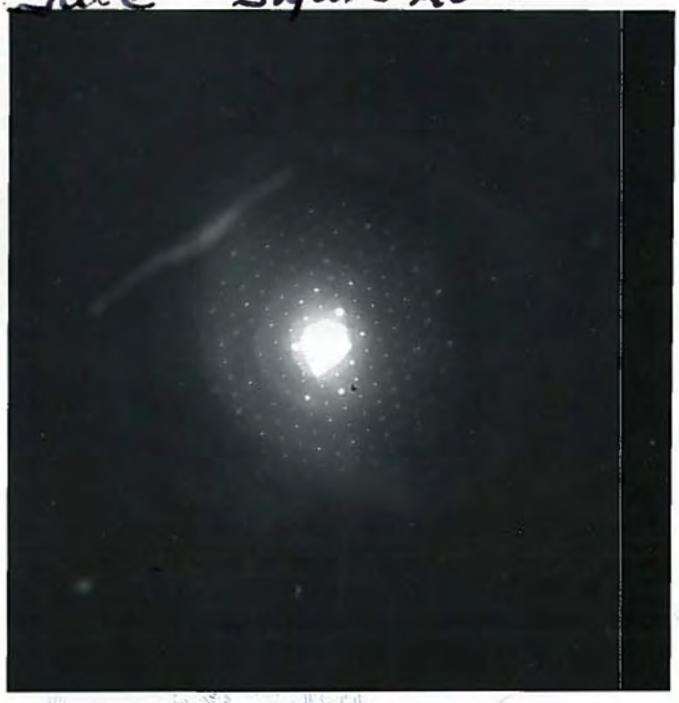
Figure 18b 10,200X

S to S 3 Grid 3
High Mag
Same as prev.

Figure 19

Lewin Grid 2

Talc Figure 20



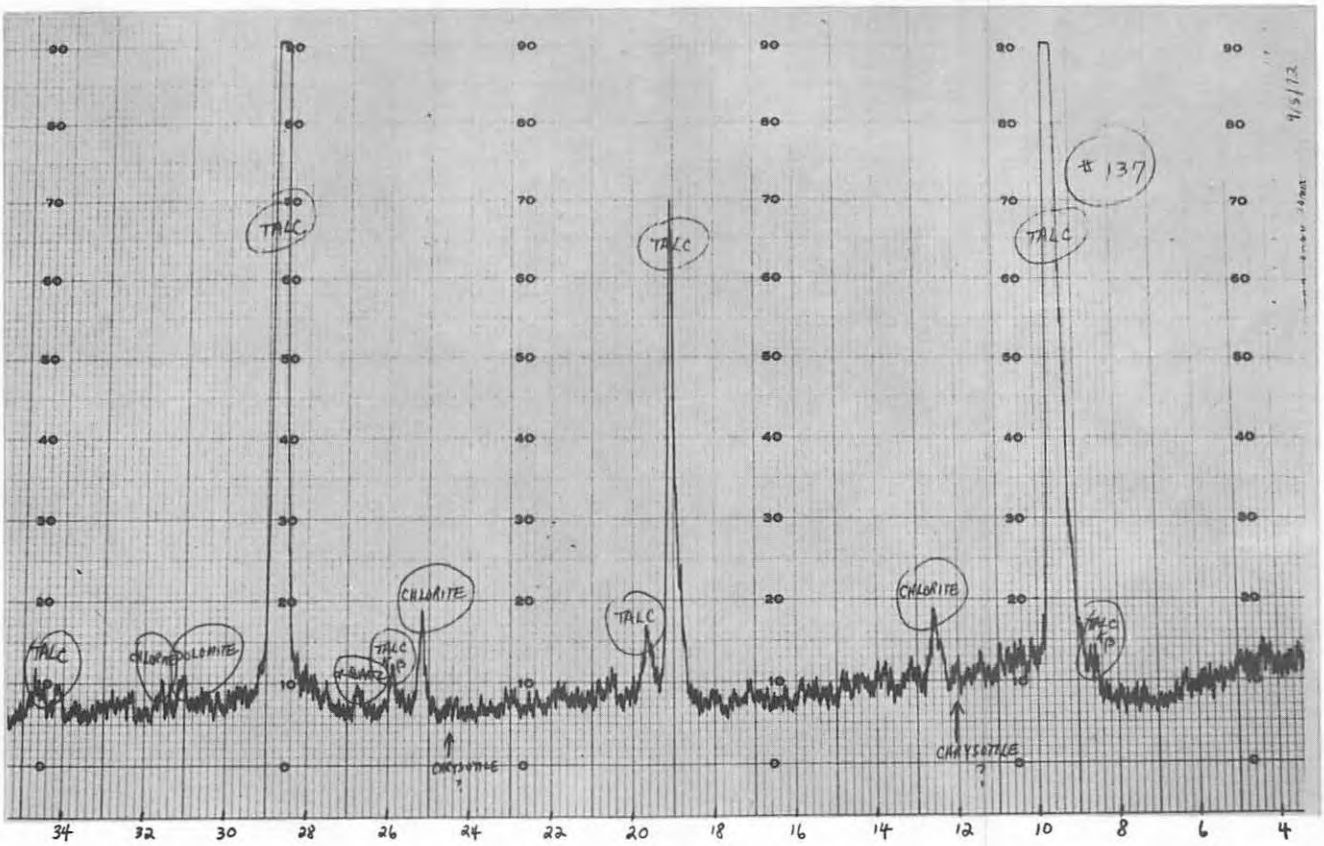
Talc standard from Leeds Gold

and 19. In Figures 17a and 18a, electron micrographs of the transmission type show the typical stranded appearance of crysotile asbestos. In each case, Figures 16 through 19, the diffraction pattern is closely similar to that indexed for crysotile asbestos. Figure 18a is a double exposure of the diffraction pattern and the bright field micrograph. In order to avoid confusion as to the area used in diffraction, the bright spot at the center of the micrograph is a delineation of the area used in diffraction. The diffraction pattern, however, is rotated by roughly 40° from the axis of the specimen. It is felt therefore that crysotile asbestos does exist in the specimens of shower to shower and Lewin supplied to this laboratory. It is, however, further concluded that, on the basis of samples supplied to us, transmission electron microscopy can only find a total material by volume of less than 1/100 of 1 percent crysotile asbestos in the shower to shower material and less in the Lewin material.

CONCLUSIONS

The extensive investigation reported here must conclude that the scanning electron microscope by itself is unable to make distinctions between asbestos fibers within samples of talc and other such fibers of wood, wool, and talc fibers. Only the shredded appearance (not found in any specimen examined other than that purposely doped with asbestos) is the sole basis for assuming the existence of asbestos in the specimens. Efforts to use non-dispersive X-ray detection yielded a negative result, and could not be used as well. Transmission electron microscopy shows less than 1/100th of 1 percent asbestos in the material given to us. Neither scanning microscopy alone or in conjunction with microchemical analysis can be reasonably expected to prove the existence of crysotile asbestos in talc.

SAMPLE NO. 137. X-RAY DIFFRACTION PATTERN Lot No. 0709 XY




Analytical Results: TALC 89%; CHLORITE 4%; α-QUARTZ 3%; DOLOMITE 2%; CHRYSOTILE 2%

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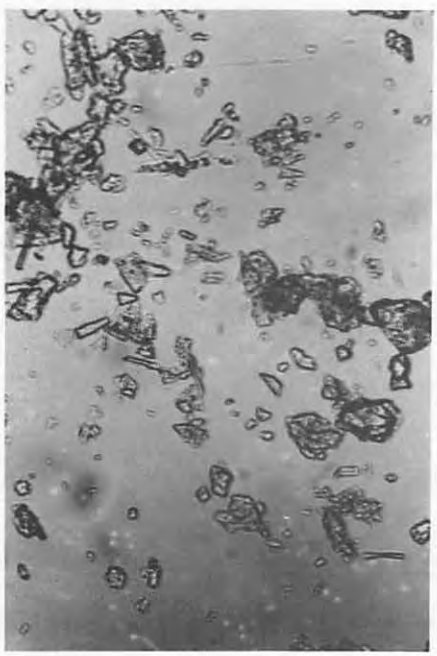
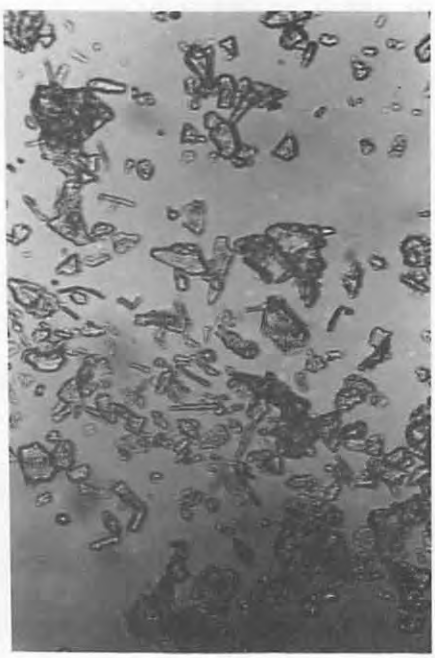
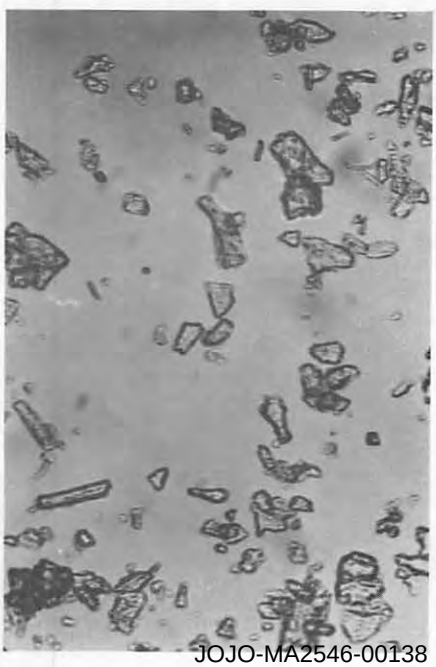
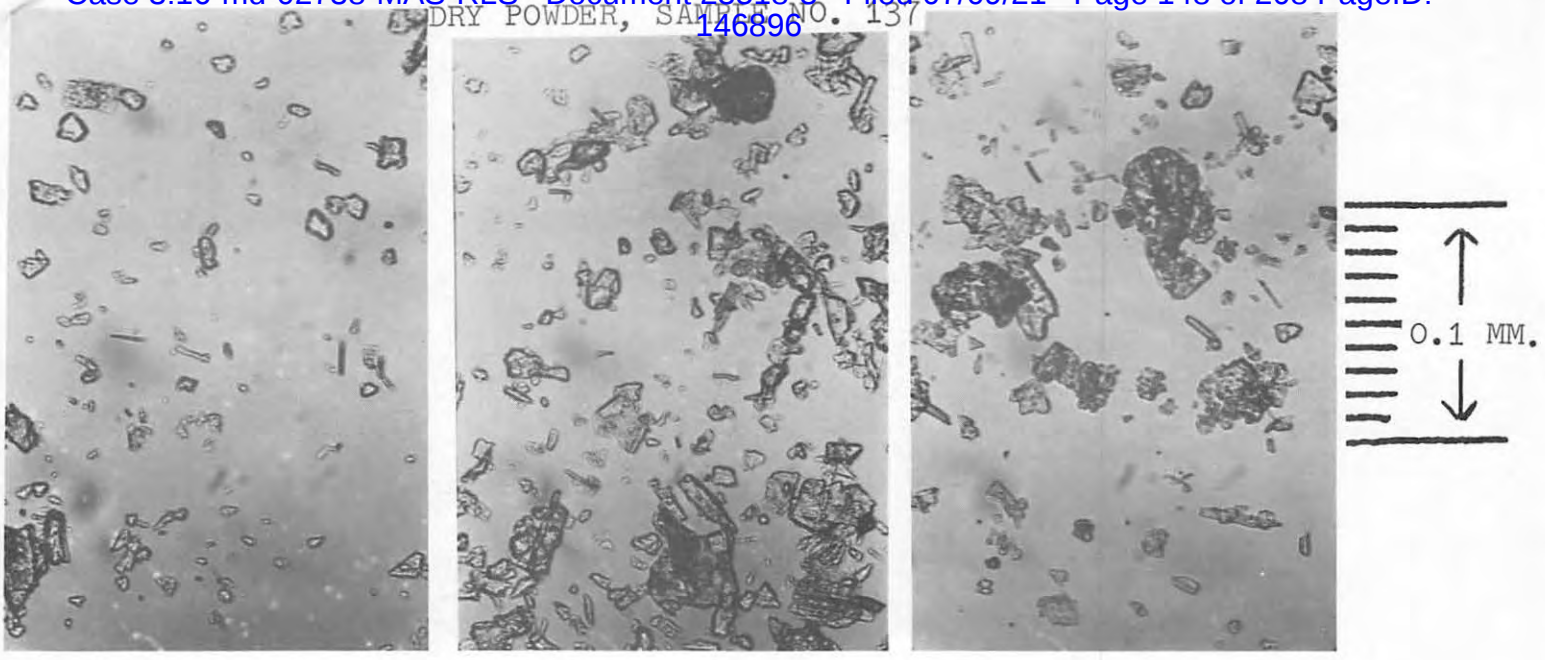
Below: PHOTOMICROGRAPHS OF DRY POWDER NO. 137

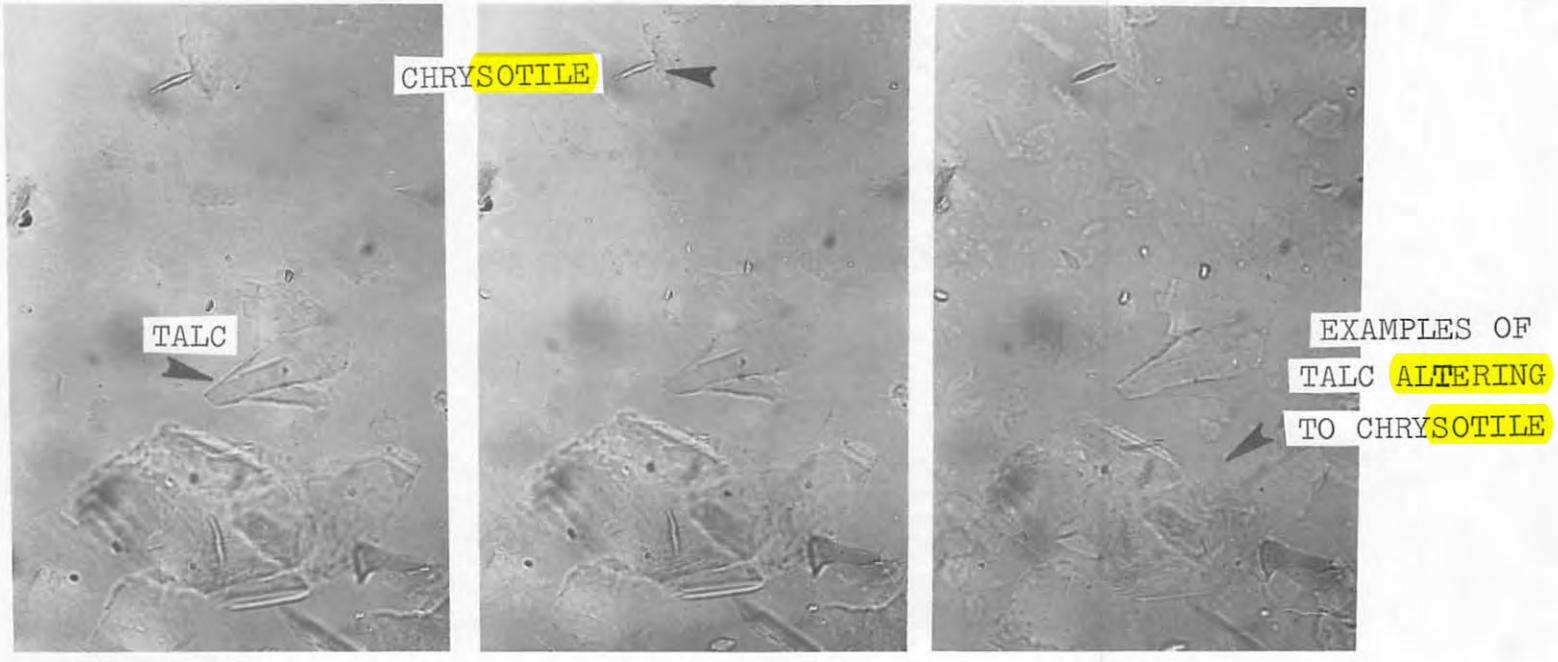




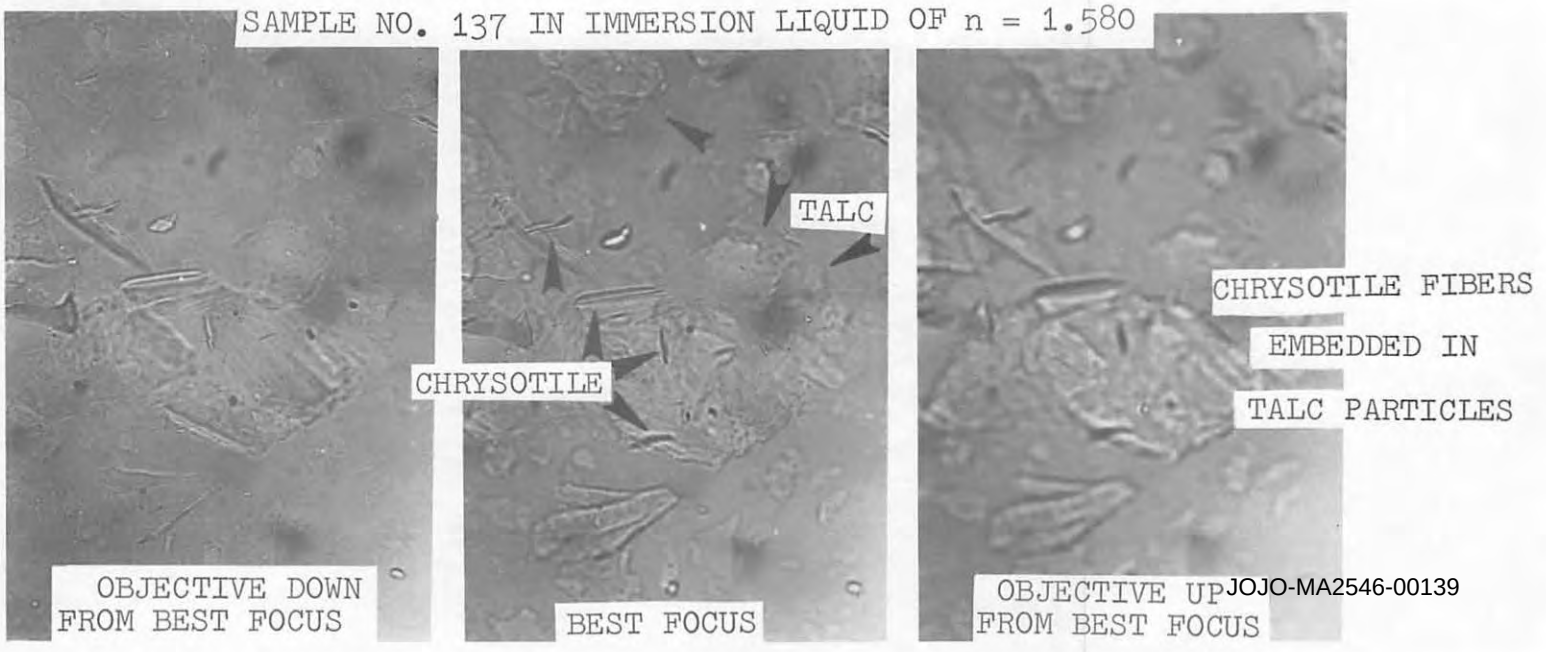


DRY POWDER, SAMPLE NO. 137

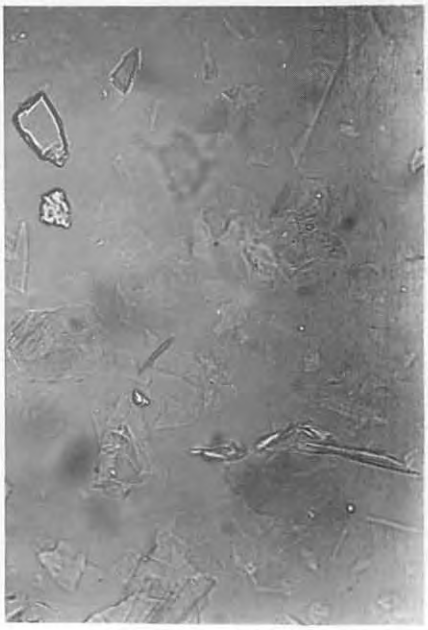


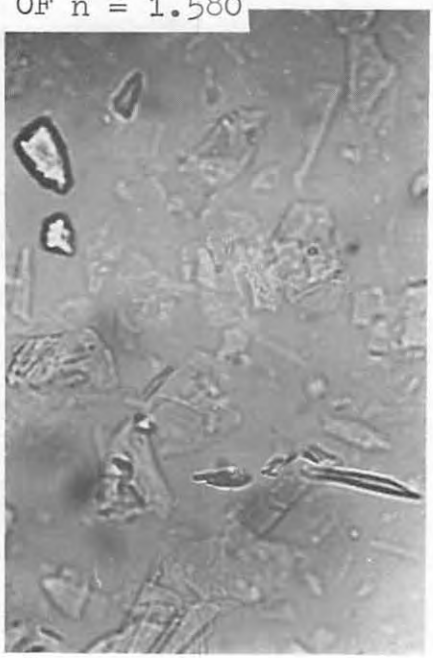



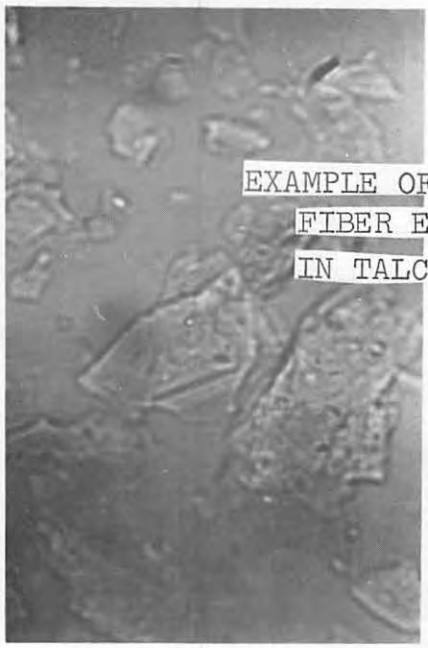

SAMPLE NO. 137 IN IMMERSION LIQUID OF n = 1.580

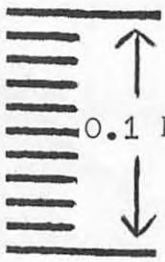


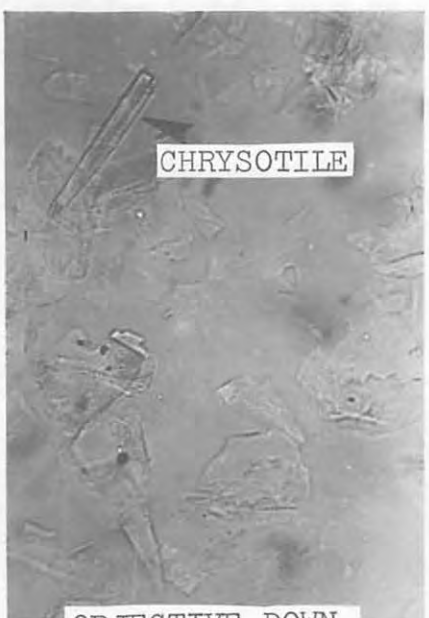
SAMPLE NO. 137 IN IMMERSION LIQUID OF n = 1.580

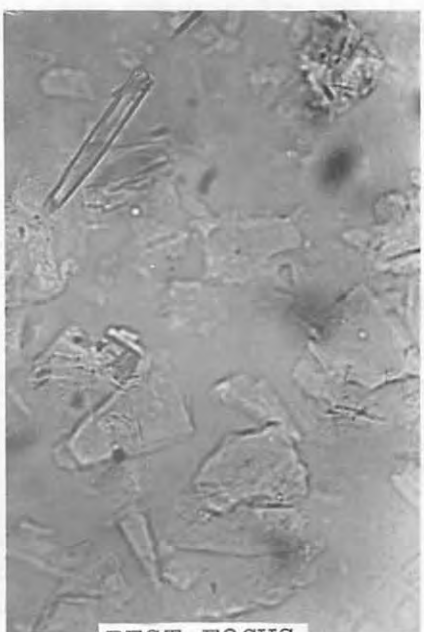



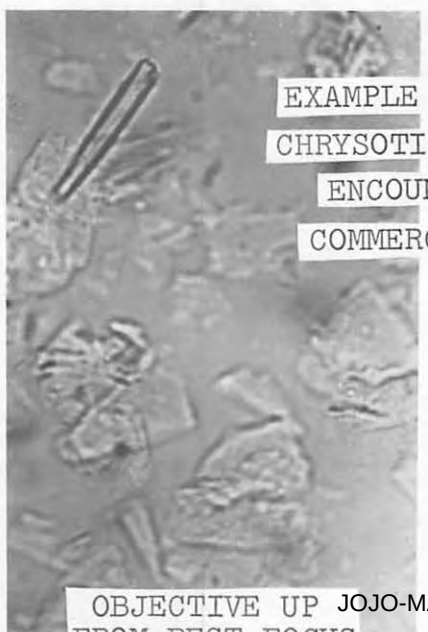


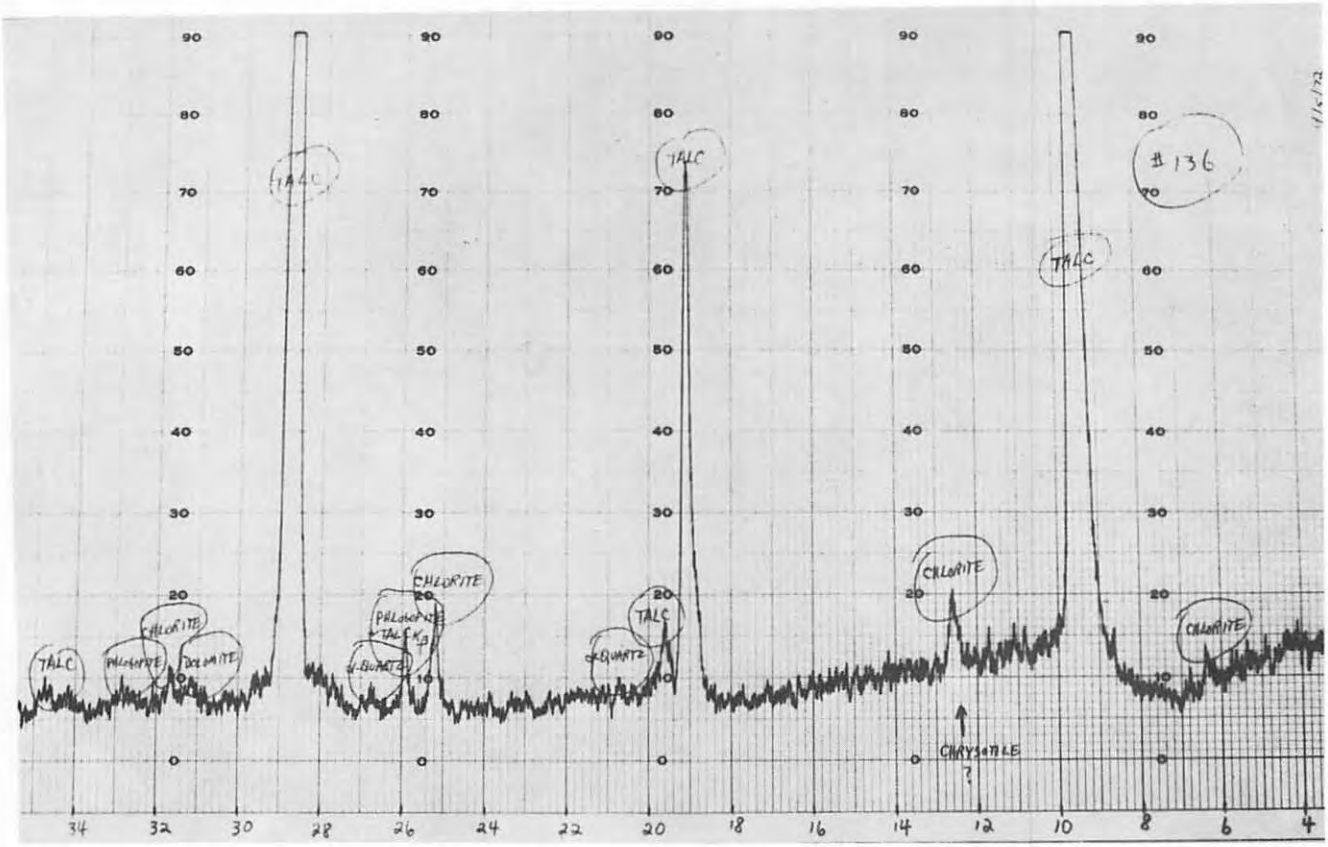



SAMPLE NO. 136. X-RAY DIFFRACTION PATTERN




Analytical Results: TALC 87%; CHLORITE 4%; PHLOGOPITE 3%;
α-QUARTZ 2%; DOLOMITE 2%; CHRYSOTILE 2%

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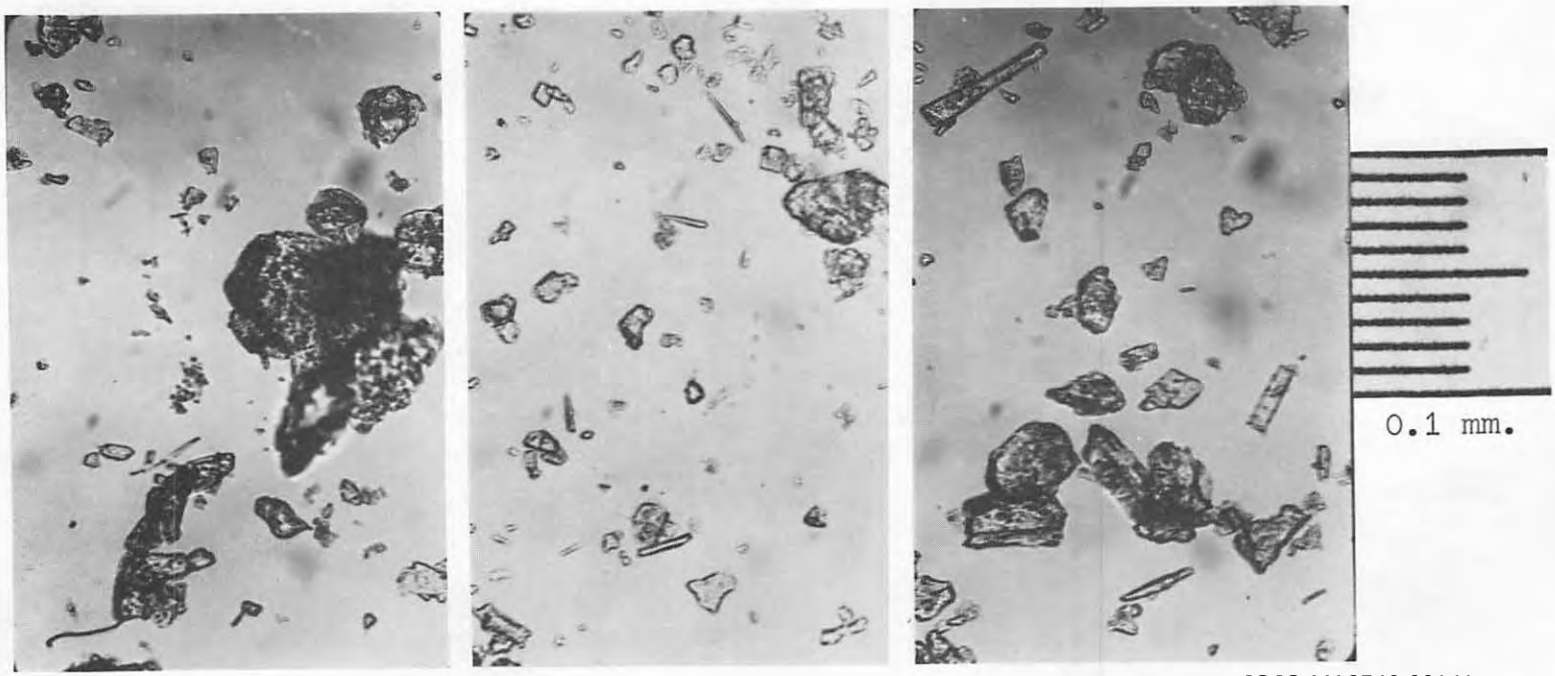
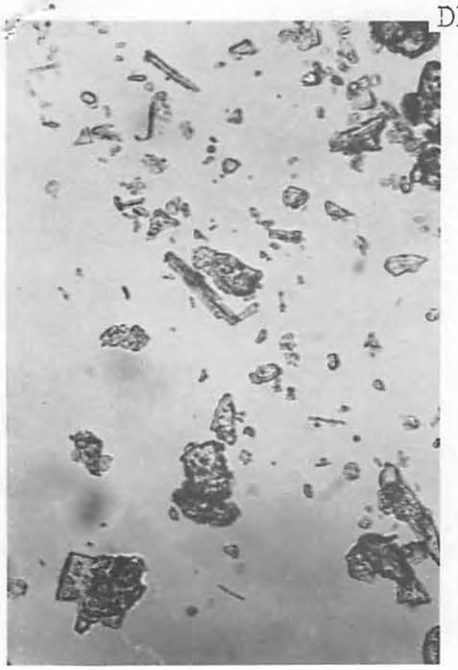
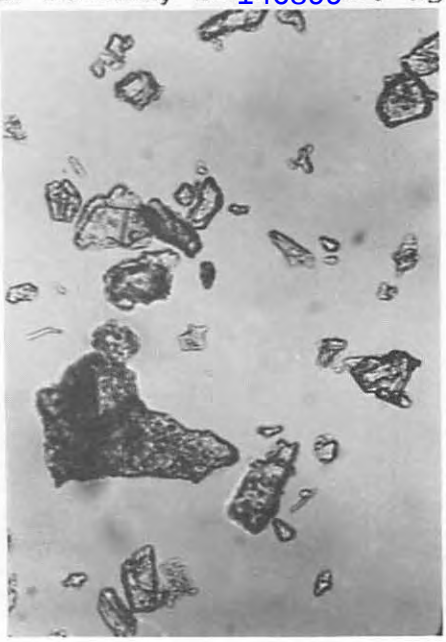
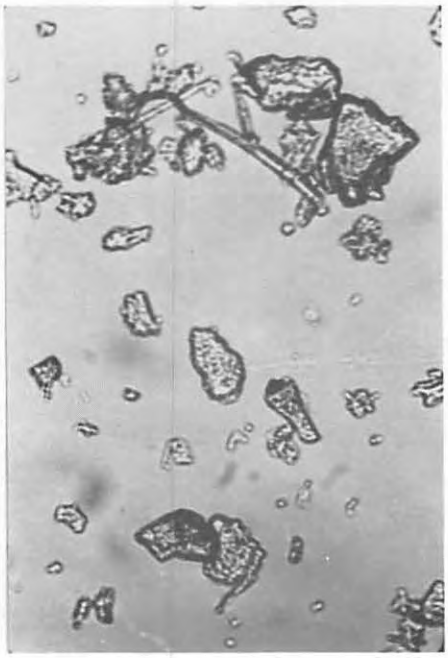
PHOTOMICROGRAPHS OF DRY POWDER NO. 136



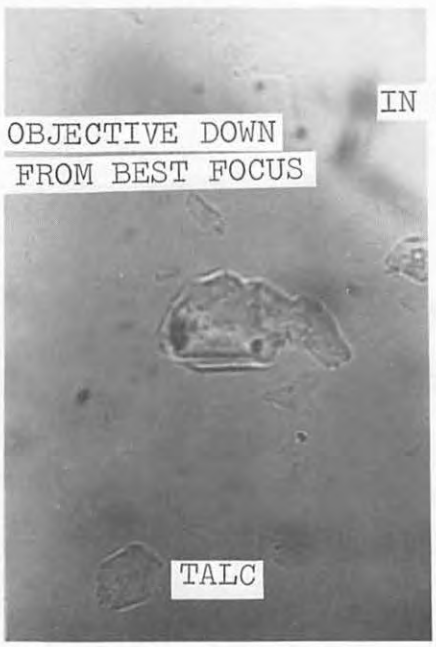
DRY POWDER, SAMPLE NO. 136

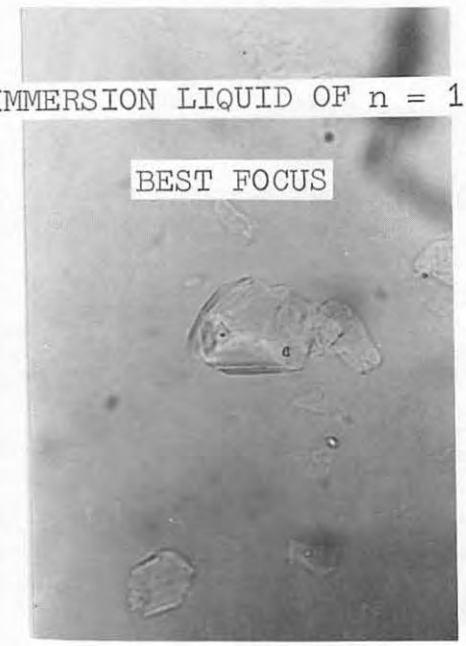






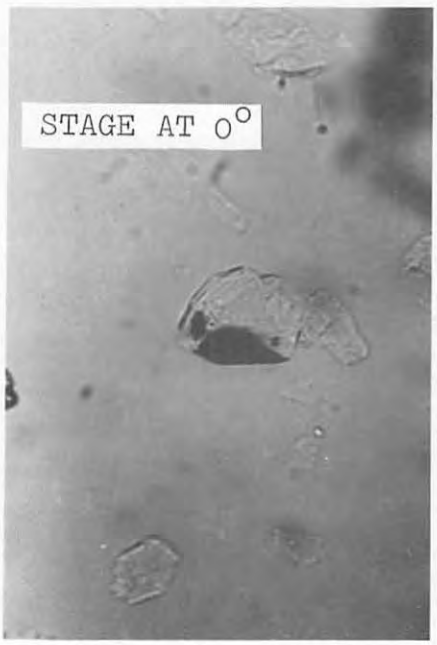
IN IMMERSION LIQUID OF n = 1.580

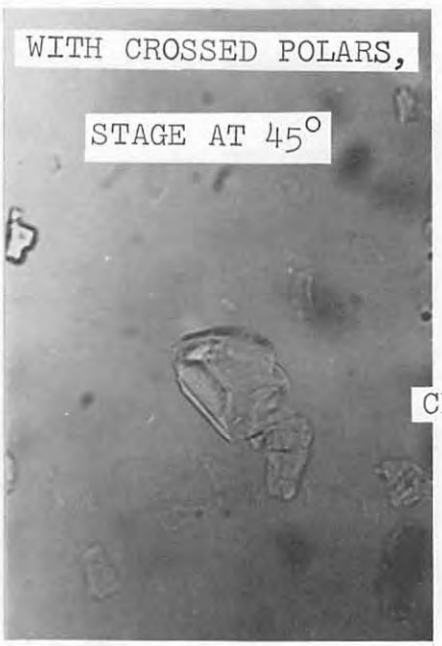


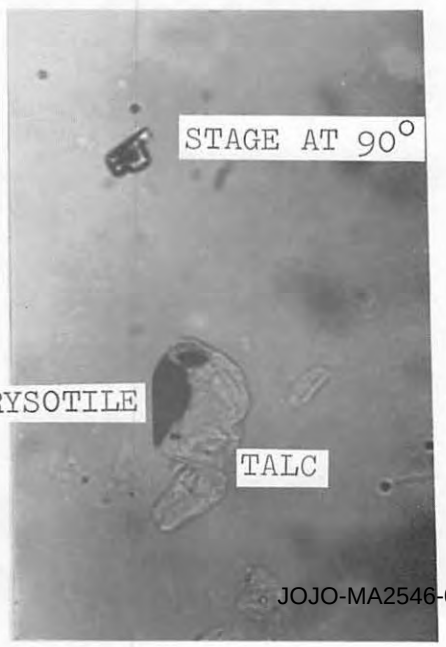



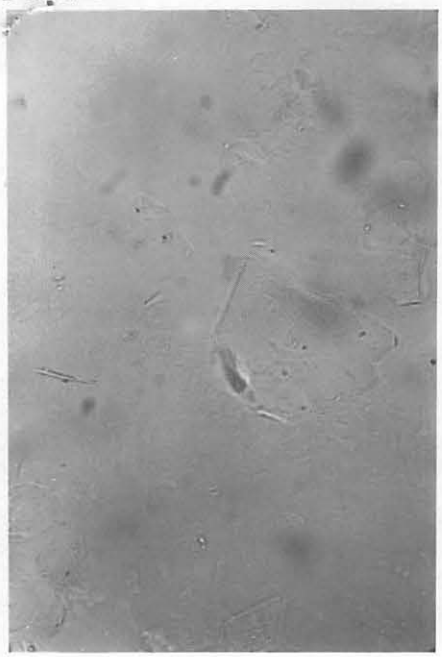


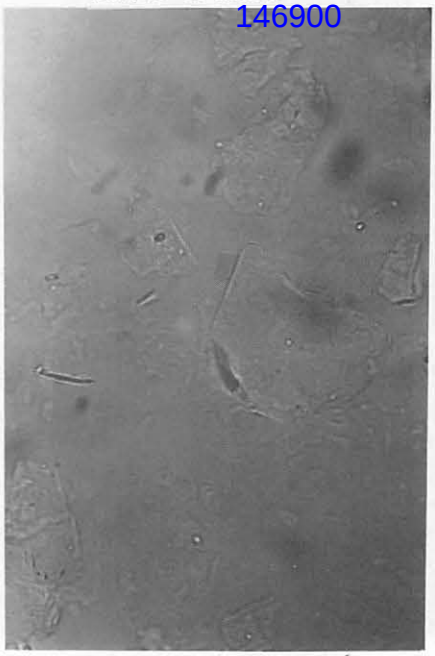
WITH CROSSED POLARS,

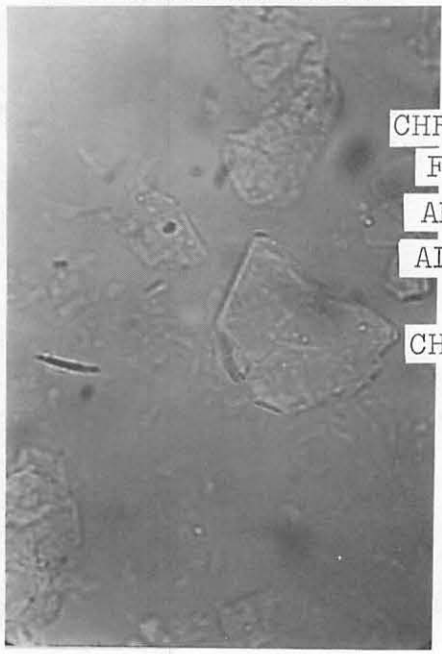


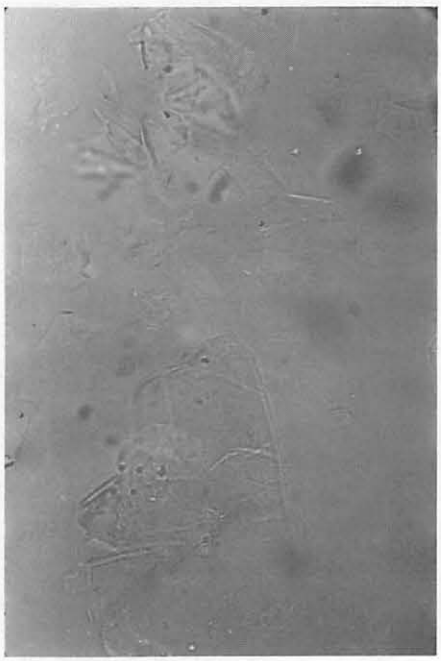


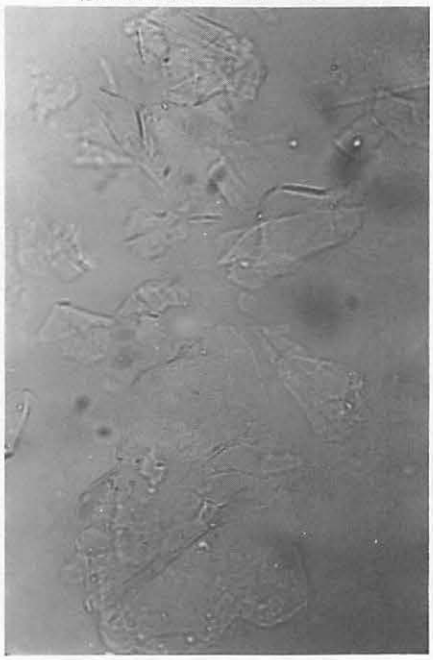


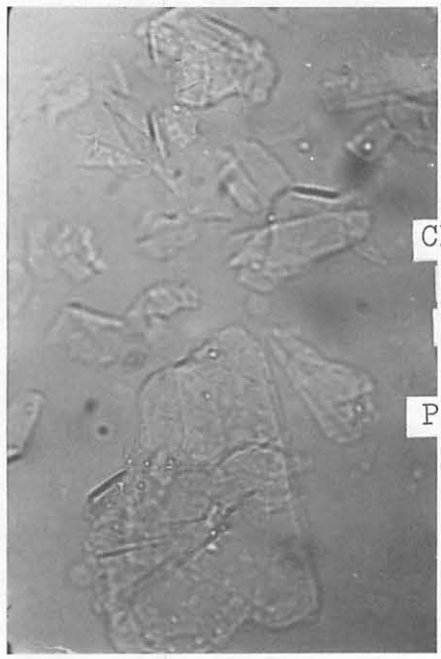


CHRYSOTILE FIBERS AND TALC ALTERING TO CHLORITE

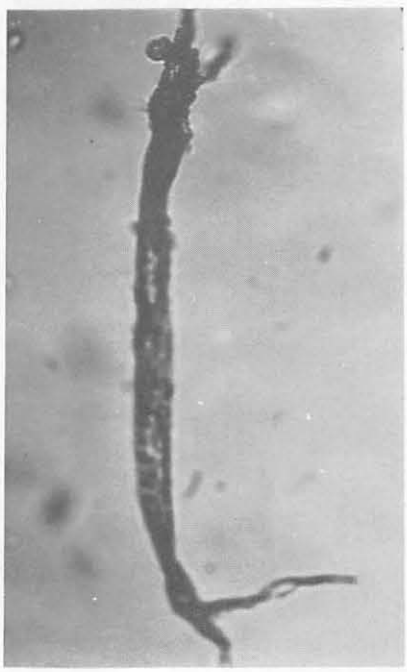
SAMPLE NO. 136

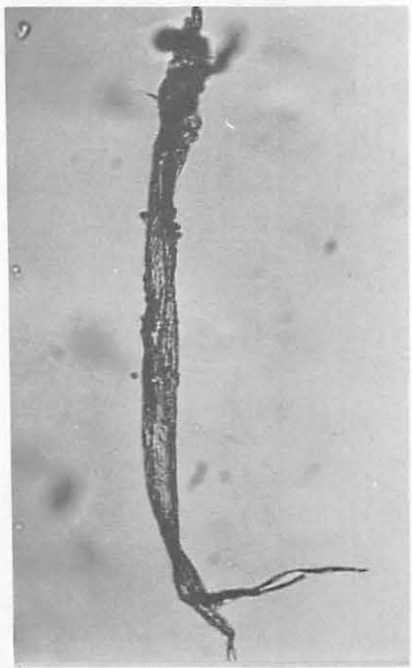


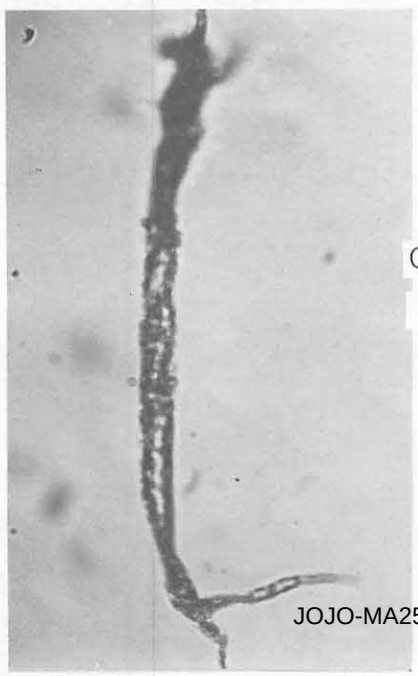




CHRYSOTILE FIBERS WITHIN TALC PARTICLES







ORGANIC FIBER

Transmision Electron Microscope

Thos. Hutchinson, Univ. of Minn.

Particle settleing in a swirl tube was used for obtaining the dispersion of "tale" on 200 mesh microscope grids. Lewin and Shoever to shoever were collectetel.

Lewin

Roughly 900 grid squares were scanned in the T.E.M at moderate magnification. Fine fiberous particles were found which gave electron diffraction patterns unmistakably crysotile asbestos. One highly suspect particle gave an nonerysotile diffraction pattern. The partices were generally less than 30 microns in length and had the typical fiber structure. No bundle branch and join was however seen.

Shower to Shower.

Approximately 2100 grid squares were examined. Numerous examples of fiberous structures were seen. Electon diffraction of these fibers showed no resemblance to crysotile asbestos patterns. Three clear examples were found of serpentine material and which gave perfect crysotile patterns.

Two long fibers were found singly and two others were in the same grid square and apparently in close association with a tale structure. These fibers showed clear ~~fibrous~~ filamented structure at high magnification.

Total Concentration Calculation (Shower to Shower)

Prints of the micrographs were cut to estimate the relative ~~area~~ area of asbestos and ~~tale~~ tale areas. One fifth of one square contained incontrovertible asbestos. while approximately 1550 squares were covered with tale. This yeild an area percentage of one part in 7500 or roughly one one hundreth of one percent.

The total concentration of all "fibers" was near .one percent.

Summary: Neither scanning microscopy alone or aided by x-ray energy dispersive elemtent detection can unequivocably indentify crsotile asbestos in concentration of a few percent. No elemental tag exists to discriminate asbestos from other fibrous minerals present. T.E.M. with electron diffraction shows less than ~~.~~ .01%

Thos E Hutchinson, Univ of Minnesota

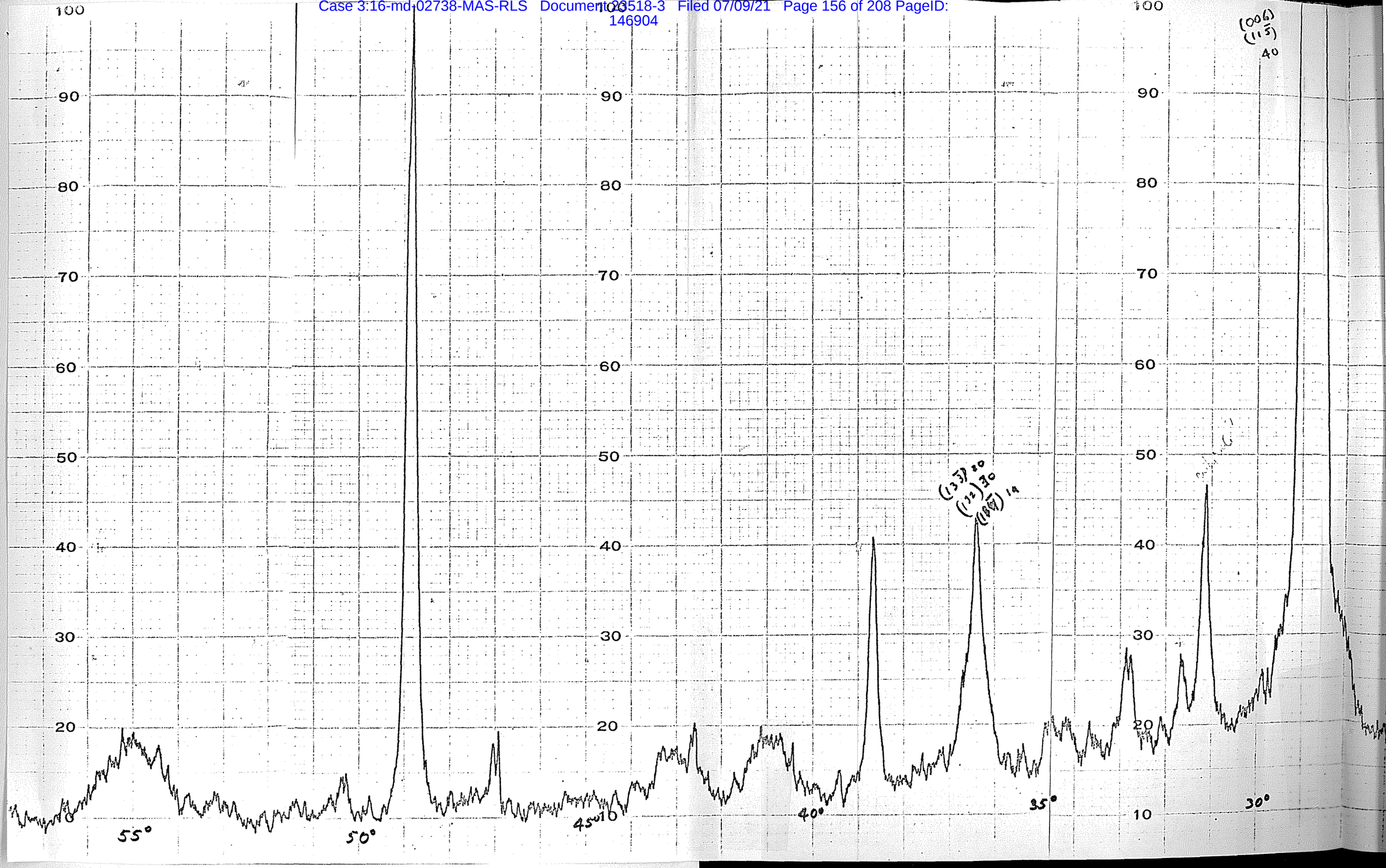
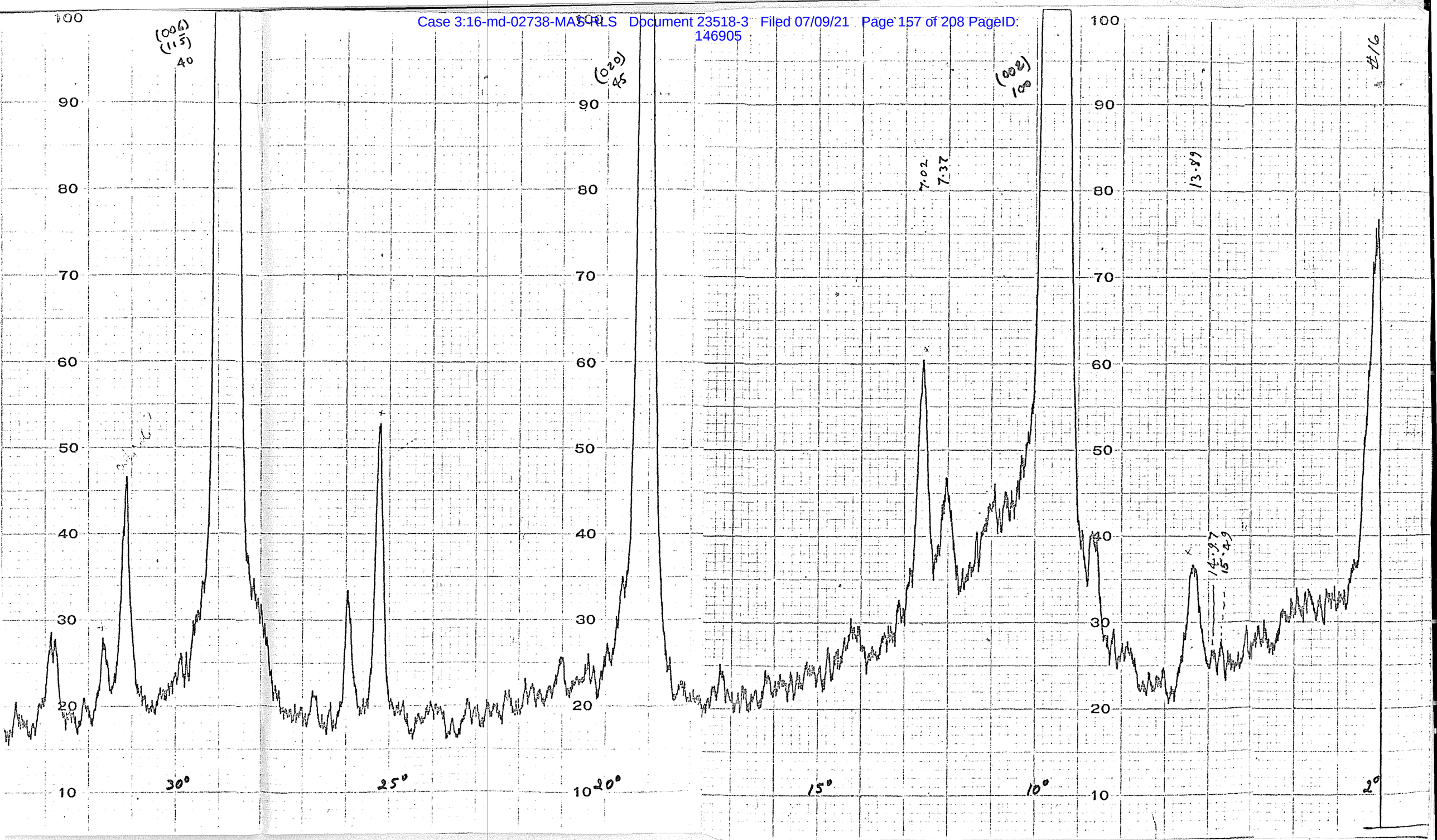



Figure 20 Full diffractometer trace of Sample No. 16


100
90
80
70
60
50
40
30
20
10
(006)
(115)
40
30°
(020)
45
25°
20°
7.02
7.37
(002)
100
15°
13.89
#16
14.87
15.49
10°
2°

# EXHIBIT F

file TALC CTFA



G. LEE

Johnson & Johnson
HEALTH CARE DIVISION

FROM: Mr. Wallace H. Steinberg DATE: December 17, 1974

TO: Dr. Norman F. Estrin (C.T.F.A.)
Dr. John Menkart (Clairol, Inc.)

SUBJ: TALC

The talc task force has completed the process of development of analytical procedures for determining the presence of chrysotile and tremolite in talc. We believe it is critical for the C.T.F.A. to now recommend these methods to the F.D.A. before the art advances to more sophisticated techniques with higher levels of sensitization.

At this time, Pfizer and Whittaker, Clark and Daniels have delayed supporting the recommendation until they can confirm the reliability of the technique. Both companies have requested and received a two month delay, which we consider reasonable.

Any further delays without good justification, we would oppose because delays in our recommendation to the F.D.A. can move us to a less favorable time for review.

I recommend this subject be added to our January 8 Agenda because of its critical timing, and also that Mr. Sandland be invited for an up-to-date report.

Wallace H. Steinberg
Director of Development
Health Care Division

cjb

cc: Mr. G. Sandland (Bristol-Myers)
Mr. R. C. Stites
Mr. J. W. Melton

bcc: Dr. L. L. Kaplan
Mr. G. Lee
Dr. D. R. Petterson

# EXHIBIT G

# JNJMX68_000004346

## Metadata

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|---|---|---|
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CF

Johnson & Johnson
BABY PRODUCTS COMPANY

RARITAN, N.J. 08869

November 24, 1976

TO: Mr. George Lee

Attached is a copy of a disturbing proposal request which the FDA has currently made available to qualified bidders. The scope of the work is the Separation of Asbestos in Foods, Drugs and Talc for Identification and Determination.

I find this proposal more disturbing than other proposals up to now because it aims at separation and isolation of asbestos from a wide scope of products and animal tissues. Up to now, our main problems have had to do with identification, whereas, now it looks like the FDA is getting into separation and isolation methodology which will mean concentration procedures. As I have pointed out many times, there are many talcs on all markets which will be hard pressed in supporting purity claims, when ultra sophisticated assay separation and isolation techniques are applied. Chances are that this FDA proposal will open up new problem areas with asbestos and talc minerals.

I intend to keep tuned into the matter through my outside mineral friends who called the thing to my attention while I was at a fiber meeting in Montreal, November 8th and 9th.

WHA.
W. H. Ashton
BY File

Attachment
WHA:blb

cc: Dr. D. R. Petterson, no attach.
Dr. B. Semple, no attach.

# EXHIBIT H

Johnson & Johnson
LIMITED

OF THE "ANALYTICAL"

SOUTHAMPTON ROAD COSHAM PORTSMOUTH HANTS. PO6 4RL. TEL: COSHAM 75298

for 50 years
the most trusted name in Britain for
Baby Products and Surgical Dressings

Our ref: IWS/VW 18th February 1975.

Dr. R. Rolle.,
Johnson & Johnson Research Centre.,
U.S.Highway No. 1.,
North Brunswick,
New Jersey 08903.,
U. S. A.

Dear Bob,

I am writing to put you in the picture regarding the U.K. work on analytical methods and to ask you to keep me informed on your front so that we can present a united front on this topic. I understand that you are the Chairman of the C.T.F.A. Committee on analytical methods. I serve on the T.P.F. Talc working party and the T.P.F. analytical sub committee.

I am therefore enclosing data on an Infra Red technique being worked on by Yardley and Avon. This is intended to be specific for tremolite and to be used only as a routine quality control check. Perhaps you could let me have your comments on the I.R. technique together with any results you have obtained in your own researches on Infra Red techniques.

I have also enclosed our test method for the proposed Xray technique which was drawn up by Boots Ltd in conjunction with Dr. Pooley. We deliberately have not included a concentration technique as we felt it would not be in worldwide company interests to do this. However, Fred tells me that you are now considering such a test in the U.S.A. If you are, it is important that the U.K. uses the same technique.

We have started a reference library of standard talc/ minerals and I will send you a photocopy of the data so far. We would be pleased to include any input you might feel necessary.

Avon, U.K., have been receiving copies of the CTFA task force meeting minutes. Could I ask you to provide me with copies also?

Many thanks for your help.

Kind regards,

Yours sincerely,

Ian.

I.W. SLOAN

# EXHIBIT I

# MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION

TO : Robert M. Schaffner, Ph.D.
Associate Director for Technology (HFF-400)

DATE: March 18, 1976

FROM : Director, Division of Cosmetics Technology (HFF-440)

SUBJECT: Asbestos in Talc

I reviewed the correspondence submitted by CTFA's Dr. Estrin at the meeting of the CTFA Talc Subcommittee with the FDA on March 15 and would like to submit the following comments:

AVON had McCrone Associates, a consulting laboratory, evaluate in 1973, 170 talc samples by x-ray diffraction (X-RD). Since 1974, 250 samples have been evaluated in-house by differential thermal analysis (DTA) and by infrared spectroscopy (IR) for tremolite. This amount of analytical work appears to confirm Avon's statement that essentially every shipment of talc is tested. I do not know whether IR is adequate to determine tremolite.

CHESEBROUGH-PONDS conducted 84 analyses in the last three years for chrysotile and amphiboles by X-RD. Where X-RD showed positive results the samples were subjected to analysis by optical microscopy (OM) to verify the fibrous structure. Chesebrough-Ponds appears to be conducting only random analyses considering their talc business, number of tests conducted and the fact that talcs from three different sources are concurrently being used.

COLGATE-PALMOLIVE claims to have conducted 42 talc analyses since 1971, however, these analyses reflect only 20 raw materials and 17 finished products, and the same material may have been tested twice, first as a raw material and then as a finished product. Tests have been conducted by McCrone Associates and in-house using X-RD and OM or TEM where necessary to determine the fibrous structure. Three samples, two in 1971 and one in 1972, were found to contain chrysotile up to 100 ppm which Colgate-Palmolive claims to be possible background contamination. Considering the size of Colgate-Palmolive's talc business, the analytical effort is very small.

COTY claims to have analyzed selected lots of talc by X-RD and TEM at Pfizer's Laboratory. No numbers of analyses are provided. The talc supplier is Whittaker, Clark & Daniels.

CYPRESS INDUSTRIAL MINERALS, CO., a supplier of Montana Talc to the cosmetic industry claims to have conducted 2,839 evaluations by CTFA's

X-RD method up to August 1975 and 50 additional evaluations thereafter. This appears to be a responsible test program.

FABERGE had McCrone Associates investigate 12 talc products in 1972 when the asbestos issue was first raised and an additional six samples in November 1975. Obviously, no meaningful quality control program has been instituted.

JOHNSON & JOHNSON reports to have tested in 1972 - 1973, 93 lots of talc by X-RD and since October 1973 an additional 100 lots by X-RD and DTA, and occasionally, where appropriate, by TEM. Allegedly every talc shipment is routinely examined for asbestos. The number of analyses appears to be low, however.

Johnson & Johnson also reported the analyses of American and British talc products based on a cooperative study between Dr. Langer and Dr. Pooley. This study involved the 19 samples analyzed by Dr. Langer of which 10 samples were implicated to contain asbestos. Wherever Dr. Langer reported tremolite and anthophyllite, Dr. Pooley only found anthophyllite. Dr. Pooley did not find asbestos in those samples where Dr. Langer determined asbestos at concentrations of less than 5% i.e., Dr. Pooley implicated only five samples. In the British talc samples Dr. Pooley found anthophyllite in one and Dr. Langer found anthophyllite and tremolite in four samples. These were also samples collected in 1973.

McCRONE ASSOCIATES reported to have done analytical work under contract for Avon, Bristol-Myers, Chesebrough-Ponds, Colgate-Palmolive, Faberge, Johnson & Johnson, Windsor Minerals, and Whittaker, Clark & Daniels, using principally X-RD and OM where appropriate. TEM examinations were also conducted. Since 1973 no chrysotile or asbestiform amphibole was detected, however, no figures were provided on the analyses conducted.

STERLING DRUGS, the manufacturer of ZBT Baby Powder, reports one-third of all talc lots purchased have been tested by X-RD. No mention is made as to how many samples of each lot were collected to obtain statistically meaningful data. Furthermore, it is difficult to determine whether sampling of one-third of the lots is adequate, particularly if one does not know whether different sources of supply were used simultaneously.

WHITTAKER, CLARK & DANIELS (WC&D), perhaps the most important supplier of talcs of various origins and quality grades to the cosmetic industry, claims to have analyzed, under contract, 74 samples during the past four years. Considering the nature of WC&D's business volume, the variety of sources of supply, the various quality grades of talc involved, and the fact that this firm also supplies other industries with industrial talcs which do contain asbestos, I am greatly concerned about their limited effort to control the quality of their cosmetic talc. Their sales catalogue lists at least 20 grades or types of cosmetic talc. Accordingly, any type of talc underwent one analysis for asbestos per year. On the basis of this effort WC&D have provided their consumers with written assurance that they routinely monitor shipments of talc for asbestiform minerals and have found no detectable amounts. This assurance might be misleading and give the cosmetic industry the false impression that WC&D talcs are adequately tested for asbestos. I am also very much concerned about the fact that a firm of this standing in the cosmetic industry does not have facilities to do its own analytical work.

In summary, though the submission by the CTFA Talc Subcommittee looks impressive at first hand, it does not offer much assurance that cosmetic talcs are adequately tested for asbestos. If this is all that can be expected from the cosmetic industry in the form of analytical effort in the light of the asbestos in talc publicity since 1971, we have not much choice but to move ahead as speedily as possible with a proposal of a regulation on asbestos in talc using X-RD and DTA procedures and basing the levels of adulteration of talc with asbestos fibers on the levels of sensitivity provided by these methods.

Heinz J. Eiermann

# EXHIBIT J

# JNJ000037743

## Metadata

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Distributed to Trial
3-22-76

March 11, 1976
RECORD Bergen County, N.J.
John Walcott

TALC TESTS WANTING, FDA EXPERTS ADMIT

Washington-Baby powders that are found to contain asbestos should not be allowed on the market, the Food & Drug Administration's top cosmetic expert said yesterday.

However, H. Eiermann, Director of the FDA's division of cosmetic technology, said the government so far has found no evidence that some baby and bath powders are contaminated with the cancer-causing mineral. Researchers at New York Mt. Sinai Hospital have reported finding asbestos in concentrations ranging from 2-20% in 10 of the 20 baby powder samples that they have tested.

The FDA and the Mt. Sinai researchers used different methods to identify asbestos in talc, the main ingredient in most powders, Eiermann said, and there is considerable disagreement in scientific circles about how best to analyze the complex minderals. Nevertheless, he said, the FDA has agreed to test the Mt. Sinai samples and to compare its results with those obtained by the New York scientists.

Eiermann also said the Mt. Sinai tests, which were conducted on powders purchased in 1973, may not accurately reflect the composition of the powders on the market today. Many manufacturers, he said, recently have become concerned about the asbestos content of their product, and have switched to talc supplies which are relatively free of asbestos contamination.

SAYS HANDS ARE TIED

Nevertheless, said Eiermann, the FDA lacks the legal authority, the man power, and the money to adequately protect the public for potentially hazardous cosmetics ranging from hair dyes to contaminated mascara.

Every cosmetic that goes on the market should be test," he said. The law today merely prevents manufacturers from introducing adulterated or mis-branded products. "The entire cosmetics budget, is only 2-1/2 million, and we have only 8 chemists. There are 250,000 different cosmetic products on the market and 4000-5000 manufacturers. We have 1% of the total FDA budget."

Eiermann made his comments at a 2-1/2 hour meeting yesterday with Rep. Andrew Maguire, D-NJ. Maguire, concerned about published reports of asbestos contamination in baby powders, walked in on Eiermann un-announced after lunch, with his staff health expert, his press secretary, two house investigation sub-committee staffers, and a reporter in tow.

Maguire asked Eiermann to produce his files on baby powders and to explain what the FDA has been doing about the reports of contamination.

At one point, Maguire asked whether the FDA considers any level of asbestos in powders, no matter how low, to be safe. Eiermann replied that no safe exposure to asbestos had been found, and later said that talc which is found to contain asbestos should not be used to make baby or body powder.

CALLS TESTING DIFFICULT

He said, however, that sophisticated and time-consuming techniques that are need to find asbestos fibers can test only minute amounts of talc. Because talc and asbestos often are mixed together in infinitely variable concentrations, tests on such small samples do not accurately reflect asbestos levels in larger samples of talc, he told Maguire.

The FDA, Eiermann said, wants a new law tightening government control on all cosmetics. The agency, he said, supports a bill sponsored by Senator Thomas Eagleton, D-Mo., which would require cosmetic manufacturers to safely test their products and to submit the test results to the FDA for approval before the products could be sold.

A FDA study conducted last year indicates that cosmetics may be responsible for as many as 140,000 injuries to American consumers each year, ranging from minor skin irritations to prolonged medical problems requiring professional attention. Testimony before the Senate has placed the number of cosmetic related injuries anywhere from 29,000 to 60,000 per year.

Eiermann said the FDA now is studying, among other things, hair dyes, antiperspirants, and mascara for evidence of danger. For example, he said, there is some evidence that mascara can become contaminated from contact with the skin and may cause ulcers on the cornea, the transparent cover over the lens of the eye. If the brush used to apply mascara accidentially scratches the cornea, he said, it can deposit germs which can cause corneal ulcers, which can lead to blindness. The FDA, said Eiermann, is studying the use of preservatives in mascara to prevent the spread of such germs, and may issue regulations on the composition of mascara.

There is no evidence, on the other hand, that baby powder is a potential health hazard, Eiermann said. Johnson & Johnson in New Brunswick, the nation's leading manufacturer of baby powders, has tested its talc on hamsters and has found no evidence that talc inhaled into the lungs is hazardous, he said.

When questioned, however, Eiermann acknowledged that Johnson & Johnson talc, which comes from the company's own mines in Vermont, has been found to be virtually free of asbestos. No tests have been conducted on animals using talc from New York State, which is used in some powders and which generally contains more asbestos than Vermont talc. The FDA, he said, has no plans for such tests.

"Let me go to the housewife in my district," Maguire replied. "She goes into the store and she sees 9 types of talc lined up on the shelves. How is she to know which ones are safe?"

"We cannot test every sample," Eiermann replied.

# # # #

# EXHIBIT K

# Johnson & Johnson knew for decades that asbestos lurked in its Baby Powder

A REUTERS INVESTIGATION

REUTERS/Mike Wood

Facing thousands of lawsuits alleging that its talc caused cancer, J&J insists on the safety and purity of its iconic product. But internal documents examined by Reuters show that the company's powder was sometimes tainted with carcinogenic asbestos and that J&J kept that information from regulators and the public.

By LISA GIRION in Los Angeles | Filed Dec. 14, 2018, 2 p.m. GMT

Darlene Coker knew she was dying. She just wanted to know why.

She knew that her cancer, mesothelioma, arose in the delicate membrane surrounding her lungs and other organs. She knew it was as rare as it was deadly, a signature of exposure to asbestos. And she knew it afflicted mostly men who inhaled asbestos dust in mines and industries such as shipbuilding that used the carcinogen before its risks were understood.

Coker, 52 years old, had raised two daughters and was running a massage school in Lumberton, a small town in eastern Texas. How had she been exposed to asbestos? “She wanted answers,” her daughter Cady Evans said.

Fighting for every breath and in crippling pain, Coker hired Herschel Hobson, a personal-injury lawyer. He homed in on a suspect: the Johnson’s Baby Powder that Coker had used on her infant children and sprinkled on herself all her life. Hobson knew that talc and asbestos often occurred together in the earth, and that mined talc could be contaminated with the carcinogen. Coker sued Johnson & Johnson, alleging that “poisonous talc” in the company’s beloved product was her killer.

J&J knew for decades that asbestos lurked in its Baby Powder

EARLY INDICATION: Cady Evans (left) and her sister, Crystal Deckard, surrounded by pictures of their mother, Darlene Coker, whose lawsuit against Johnson & Johnson 20 years ago was one of the first to allege that the company's Baby Powder caused cancer. REUTERS/Mike Blake

**J&J didn't tell the FDA that at least three tests by three different labs from 1972 to 1975 had found asbestos in its talc – in one case at levels reported as "rather high."**

J&J denied the claim. Baby Powder was asbestos-free, it said. As the case proceeded, J&J was able to avoid handing over talc test results and other internal company records Hobson had requested to make the case against Baby Powder.

Coker had no choice but to drop her lawsuit, Hobson said. "When you are the plaintiff, you have the burden of proof," he said. "We didn't have it."

That was in 1999. Two decades later, the material Coker and her lawyer sought is emerging as J&J has been compelled to share thousands of pages of company memos, internal reports and other confidential documents with lawyers for some of the 11,700 plaintiffs now claiming that the company's talc caused their cancers — including thousands of women with ovarian cancer.

A Reuters examination of many of those documents, as well as deposition and trial testimony, shows that from at least 1971 to the early 2000s, the company's raw talc and finished powders sometimes tested positive for small amounts of asbestos, and that company executives, mine managers, scientists, doctors and lawyers fretted over the problem and how to address it while failing to disclose it to regulators or the public.

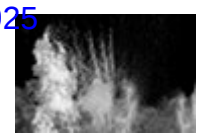
The documents also depict successful efforts to influence U.S. regulators' plans to limit asbestos in cosmetic talc products and scientific research on the health effects of talc.

A small portion of the documents have been produced at trial and cited in media reports. Many were shielded from public view by court orders that allowed J&J to turn over thousands of documents it designated as confidential. Much of their contents is reported here for the first time.

The earliest mentions of tainted J&J talc that Reuters found come from 1957 and 1958 reports by a consulting lab. They describe contaminants in talc from J&J's Italian supplier as

RELATED CONTENT

J&J knew for decades that asbestos lurked in its Baby Powder



A guiding hand on talc safety research

Read the documents cited in this article

After damaging Reuters report, J&J doubles down on talc safety message

fibrous and “acicular,” or needle-like, tremolite. That’s one of the six minerals that in their naturally occurring fibrous form are classified as asbestos.

At various times from then into the early 2000s, reports by scientists at J&J, outside labs and J&J’s supplier yielded similar findings. The reports identify contaminants in talc and finished powder products as asbestos or describe them in terms typically applied to asbestos, such as “fiberform” and “rods.”

In 1976, as the U.S. Food and Drug Administration (FDA) was weighing limits on asbestos in cosmetic talc products, J&J assured the regulator that no asbestos was “detected in any sample” of talc produced between December 1972 and October 1973. It didn’t tell the agency that at least three tests by three different labs from 1972 to 1975 had found asbestos in its talc – in one case at levels reported as “rather high.”

Most internal J&J asbestos test reports Reuters reviewed do not find asbestos. However, while J&J’s testing methods improved over time, they have always had limitations that allow trace contaminants to go undetected – and only a tiny fraction of the company’s talc is tested.

The World Health Organization and other authorities recognize no safe level of exposure to asbestos. While most people exposed never develop cancer, for some, even small amounts of asbestos are enough to trigger the disease years later. Just how small hasn’t been established. Many plaintiffs allege that the amounts they inhaled when they dusted themselves with tainted talcum powder were enough.

The evidence of what J&J knew has surfaced after people who suspected that talc caused their cancers hired lawyers experienced in the decades-long deluge of litigation involving workers exposed to asbestos. Some of the lawyers knew from those earlier cases that talc producers tested for asbestos, and they began demanding J&J’s testing documentation.


A big verdict fuels a reporter’s curiosity. REUTERS/Mike Wood

What J&J produced in response to those demands has allowed plaintiffs’ lawyers to refine their argument: The culprit wasn’t necessarily talc itself, but also asbestos in the talc. That assertion, backed by decades of solid science showing that asbestos causes mesothelioma and is associated with ovarian and other cancers, has had mixed success in court.

In two cases earlier this year – in New Jersey and California – juries awarded big sums to plaintiffs who, like Coker, blamed asbestos-tainted J&J talc products for their mesothelioma.

A third verdict, in St. Louis, was a watershed, broadening J&J’s potential liability: The 22 plaintiffs were the first to succeed with a claim that asbestos-tainted Baby Powder and Shower to Shower talc, a longtime brand the company sold in 2012, caused ovarian cancer, which is much more common than mesothelioma. The jury awarded them $4.69 billion in damages. Most of the

talc cases have been brought by women with ovarian cancer who say they regularly used J&J talc products as a perineal antiperspirant and deodorant.

At the same time, at least three juries have rejected claims that Baby Powder was tainted with asbestos or caused plaintiffs' mesothelioma. Others have failed to reach verdicts, resulting in mistrials.

J&J has said it will appeal the recent verdicts against it. It has maintained in public statements that its talc is safe, as shown for years by the best tests available, and that the information it has been required to divulge in recent litigation shows the care the company takes to ensure its products are asbestos-free. It has blamed its losses on juror confusion, "junk" science, unfair court rules and overzealous lawyers looking for a fresh pool of asbestos plaintiffs.

"Plaintiffs' attorneys out for personal financial gain are distorting historical documents and intentionally creating confusion in the courtroom and in the media," Ernie Knewitz, J&J's vice president of global media relations, wrote in an emailed response to Reuters' findings. "This is all a calculated attempt to distract from the fact that thousands of independent tests prove our talc does not contain asbestos or cause cancer. Any suggestion that Johnson & Johnson knew or hid information about the safety of talc is false."

J&J declined to comment further for this article. For more than two months, it turned down repeated requests for an interview with J&J executives. On Dec. 8, the company offered to make an expert available. It had not done so as of Thursday evening.

The company referred all inquiries to its outside litigation counsel, Peter Bicks. In emailed responses, Bicks rejected Reuters' findings as "false and misleading." "The scientific consensus is that the talc used in talc-based body powders does not cause cancer, regardless of what is in that talc," Bicks wrote. "This is true even if - and it does not - Johnson & Johnson's cosmetic talc had ever contained minute, undetectable amounts of asbestos." He dismissed tests cited in this article as "outlier" results.

In court, J&J lawyers have told jurors that company records showing that asbestos was detected in its talc referred to talc intended for industrial use. Other records, they have argued, referred to non-asbestos forms of the same minerals that their experts say are harmless. J&J has also argued that some tests picked up "background" asbestos – stray fibers that could have contaminated samples after floating into a mill or lab from a vehicle clutch or fraying insulation.

The company has made some of the same arguments about lab tests conducted by experts hired by plaintiffs. One of those labs found asbestos in Shower to Shower talc from the 1990s, according to an Aug. 11, 2017, court report. Another lab found asbestos in more than half of multiple samples of Baby Powder from past decades – in bottles from plaintiffs' cupboards and acquired from eBay, and even a 1978 bottle held in J&J's corporate museum. The concentrations were great enough that users "would have, more likely than not, been exposed," the plaintiffs' lab report presented in several cases this year concluded.

Matthew Sanchez, a geologist with consultants RJ Lee Group Inc and a frequent expert witness for J&J, dismissed those findings in testimony in the St. Louis trial: "I have not found asbestos in any of the current or modern, what I consider modern, Johnson & Johnson talc products," Sanchez told the jury.

Sanchez did not return calls seeking comment. RJ Lee said it does not comment on the work it does for clients.

Since 2003, talc in Baby Powder sold in the United States has come from China through supplier Imerys Talc America, a unit of Paris-based Imerys SA and a co-defendant in most of the talc litigation. Imerys and J&J said the Chinese talc is safe. An Imerys spokesman said the company's tests "consistently show no asbestos. Talc's safe use has been confirmed by multiple regulatory and scientific bodies."

J&J, based in New Brunswick, New Jersey, has dominated the talc powder market for more than 100 years, its sales outpacing those of all competitors combined, according to Euromonitor International data. And while talc products contributed just $420 million to J&J's $76.5 billion in revenue last year, Baby Powder is considered an essential facet of the healthcare-products maker's carefully tended image as a caring company – a "sacred cow," as one 2003 internal email put it.

"When people really understand what's going on, I think it increases J&J's exposure a thousand-fold," said Mark Lanier, one of the lawyers for the women in the St. Louis case.

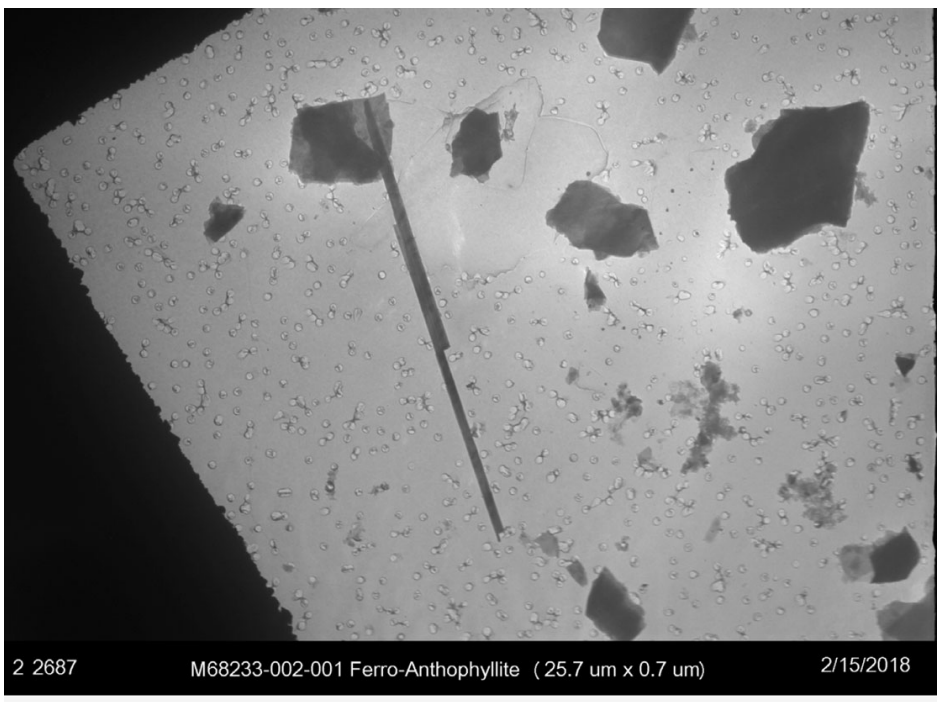
The mounting controversy surrounding J&J talc hasn't shaken investors. The share price is up about 6 percent so far this year. Talc cases make up fewer than 10 percent of all personal injury lawsuits pending against J&J, based on the company's Aug. 2 quarterly report, in which the company said it believed it had "strong grounds on appeal."

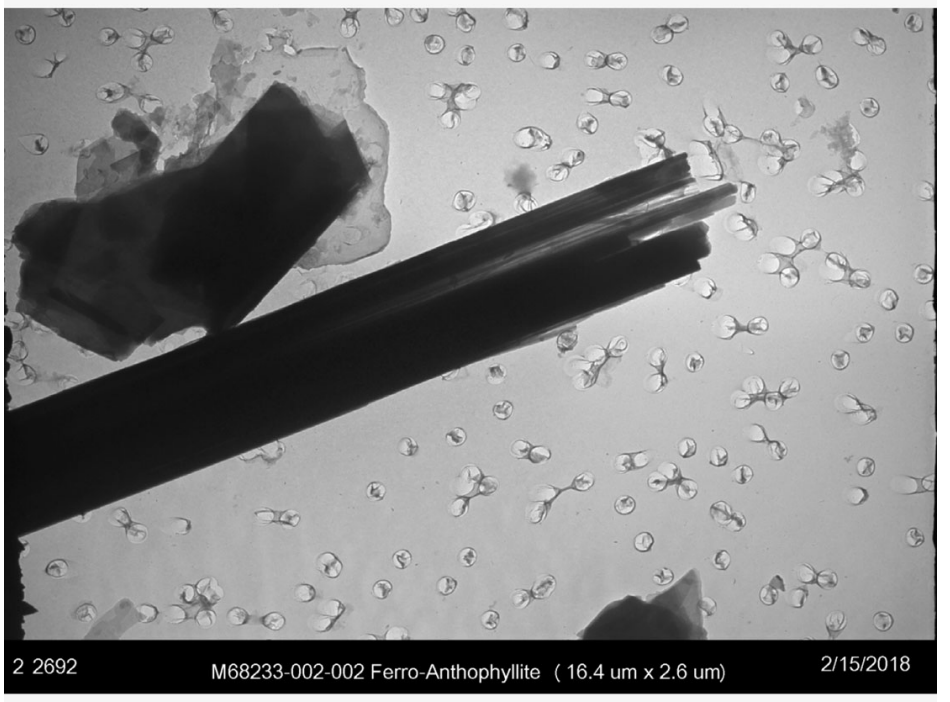
J&J Chairman and Chief Executive Officer Alex Gorsky has pledged to fight on, telling analysts in July: "We remain confident that our products do not contain asbestos."

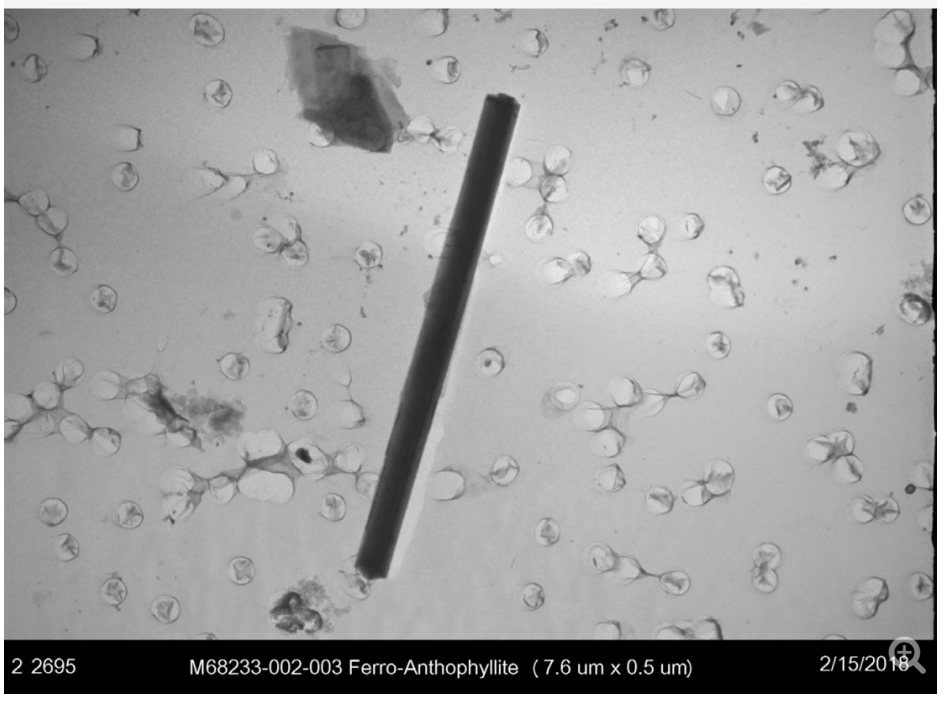
Gorsky's comment, echoed in countless J&J statements, misses a crucial point. Asbestos, like many environmental carcinogens, has a long latency period. Diagnosis usually comes years after initial exposure – 20 years or longer for mesothelioma. J&J talc products today may be safe, but the talc at issue in thousands of lawsuits was sold and used over the past 60 years.

That point is recognized in a 2013 markup of a statement for the "Safety & Care Commitment" page of J&J's website. The original version conveyed a blanket assurance of safety. The edited version was less definitive: "Our talc-based consumer products are ~~have always been~~ (we cannot say "always") asbestos free, as confirmed by regular testing since the 1970s."

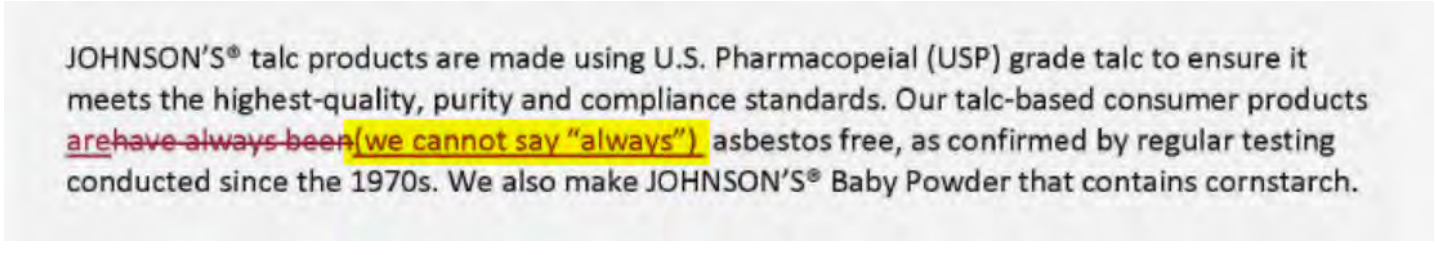
**2013**




NEEDLES IN A HAYSTACK: Bundles (top, center) and a single fiber (bottom) that a plaintiffs' lab found in a 1978 bottle of Baby Powder from J&J's corporate museum show the telltale needle-like shape of asbestos. Photo courtesy of Mark Lanier.




THEN AND NOW: A 2013 markup of a statement for J&J's website implicitly recognizes the possibility that the company's talc could have been tainted in earlier times.

## "Safety first"

In 1886, Robert Wood Johnson enlisted his younger brothers in an eponymous startup built around the “Safety First” motto. Johnson’s Baby Powder grew out of a line of medicated plasters, sticky rubber strips loaded with mustard and other home remedies. When customers complained of skin irritation, the brothers sent packets of talc.

Soon, mothers began applying the talc to infants’ diaper-chafed skin. The Johnsons took note. They added a fragrance that would become one of the most recognizable in the world, sifted the talc into tin boxes and, in 1893, began selling it as Johnson’s Baby Powder.

In the late 1950s, J&J discovered that talc from its chief source mine for the U.S. market in the Italian Alps contained tremolite. That’s one of six minerals – along with chrysotile, actinolite, amosite, anthophyllite and crocidolite – that occur in nature as crystalline fibers known as asbestos, a recognized carcinogen. Some of them, including tremolite, also occur as unremarkable “non-asbestiform” rocks. Both forms often occur together and in talc deposits.

J&J’s worry at the time was that contaminants made the company’s powder abrasive. It sent tons of its Italian talc to a private lab in Columbus, Ohio, to find ways to improve the appearance, feel and purity of the powder by removing as much “grit” as possible. In a pair of reports from 1957 and 1958, the lab said the talc contained “from less than 1 percent to about 3 percent of contaminants,” described as mostly fibrous and “acicular” tremolite.

Most of the authors of these and other J&J records cited in this article are dead. Sanchez, the RJ Lee geologist whose firm has agreed to provide him as a witness in up to 100 J&J talc trials, has testified that tremolite found decades ago in the company’s talc, from Italy and later Vermont, was not tremolite asbestos at all. Rather, he has said, it was “cleavage fragments” from non-asbestiform tremolite.

J&J’s original records don’t always make that distinction. In terms of health risk, regulators since the early 1970s have treated small fiber-shaped particles of both forms the same.

The U.S. Environmental Protection Agency, for example, “makes no distinction between fibers and (comparable) cleavage fragments,” agency officials wrote in a response to an RJ Lee report on an unrelated matter in 2006, the year before the firm hired Sanchez. The Occupational Safety and Health Administration (OSHA), though it dropped the non-fibrous forms of the minerals from its definition of asbestos in 1992, nonetheless recommends that fiber-shaped fragments indistinguishable from asbestos be counted in its exposure tests.

And as the product safety director for J&J’s talc supplier acknowledged in a 2008 email to colleagues: “(I)f a deposit contains ‘non-asbestiform’ tremolite, there is also asbestiform tremolite naturally present as well.”


“SACRED COW”: Today, Baby Powder accounts for only a small portion of J&J’s annual revenue, but is considered essential to the company’s caring image. REUTERS/Mike Segar

## “The lungs of babies”

In 1964, J&J's Windsor Minerals Inc subsidiary bought a cluster of talc mines in Vermont, with names like Argonaut, Rainbow, Frostbite and Black Bear. By 1966, it was blasting and bulldozing white rock out of the Green Mountain state. J&J used the milled powder in its cosmetic powders and sold a less-refined grade to roofing, flooring and tire companies for use in manufacturing.

Ten years after tremolite turned up in the Italian talc, it showed up in Vermont talc, too. In 1967, J&J found traces of tremolite and another mineral that can occur as asbestos, according to a table attached to a Nov. 1, 1967, memo by William Ashton, the executive in charge of J&J's talc supply for decades.

J&J continued to search for sources of clean talc. But in an April 9, 1969, memo to a company doctor, Ashton said it was "normal" to find tremolite in many U.S. talc deposits. He suggested J&J rethink its approach. "Historically, in our Company, Tremolite has been bad," Ashton wrote. "How bad is Tremolite medically, and how much of it can safely be in a talc base we might develop?"

Since pulmonary disease, including cancer, appeared to be on the rise, "it would seem to be prudent to limit any possible content of Tremolite ... to an absolute minimum," came the reply from another physician executive days later.

The doctor told Ashton that J&J was receiving safety questions from pediatricians. Even Robert Wood Johnson II, the founder's son and then-retired CEO, had expressed "concern over the possibility of the adverse effects on the lungs of babies or mothers," he wrote.

"We have replied," the doctor wrote, that "we would not regard the usage of our powders as presenting any hazard." Such assurances would be impossible, he added, "if we do include Tremolite in more than unavoidable trace amounts."

The memo is the earliest J&J document reviewed by Reuters that discusses tremolite as more than a scratchy nuisance. The doctor urged Ashton to consult with company lawyers because "it is not inconceivable that we could become involved in litigation."

## Never "100% clean"

By the early 1970s, asbestos was widely recognized as the primary cause of mesothelioma among workers involved in producing it and in industries that used it in their products.

Regulation was in the air. In 1972, President Richard Nixon's newly created OSHA issued its first rule, setting limits on workplace exposure to asbestos dust.

By then, a team at Mount Sinai Medical Center led by pre-eminent asbestos researcher Irving Selikoff had started looking at talcum powders as a possible solution to a puzzle: Why were tests of lung tissue taken post mortem from New Yorkers who never worked with asbestos finding signs of the mineral? Since talc deposits are often laced with asbestos, the scientists reasoned, perhaps talcum powders played a role.

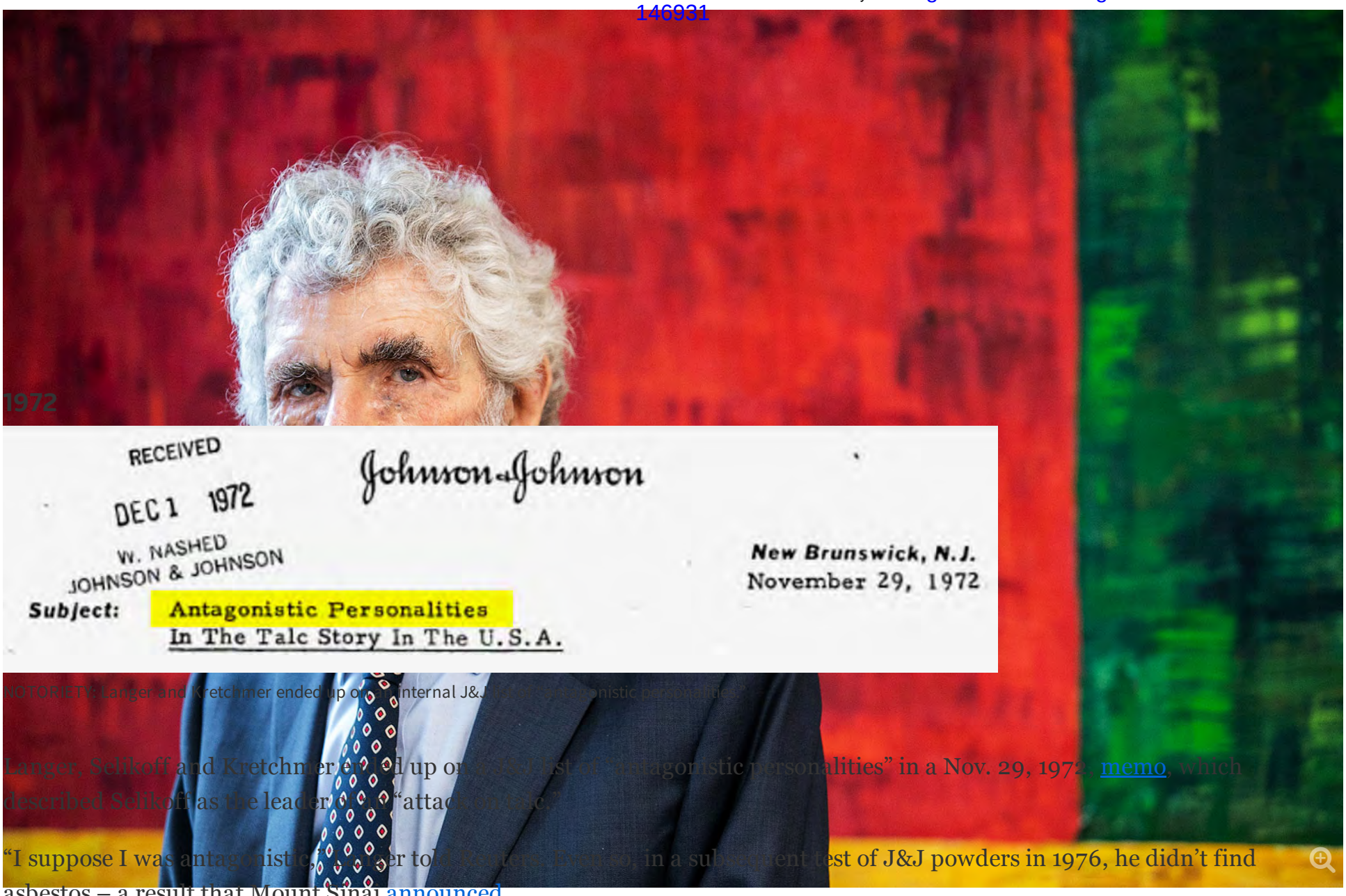
They shared their preliminary findings with New York City's environmental protection chief, Jerome Kretchmer. On June 29, 1971, Kretchmer informed the Nixon administration and called a press conference to announce that two unidentified brands of cosmetic talc appeared to contain asbestos.

The FDA opened an inquiry. J&J issued a statement: "Our fifty years of research knowledge in this area indicates that there is no asbestos contained in the powder manufactured by Johnson & Johnson."

Later that year, another Mount Sinai researcher, mineralogist Arthur Langer, told J&J in a letter that the team had found a "relatively small" amount of chrysotile asbestos in Baby Powder.

J&J knew for decades that asbestos lurked in its Baby Powder

ROCK STEADY: Dr Arthur Langer, who was part of a Mount Sinai team researching asbestos in talc in the 1970s, says he stands by his finding of small amounts of asbestos in Baby Powder. REUTERS/Julia Rendleman




NOTORIETY: Langer and Kretchmer ended up on an internal J&J list of "antagonistic personalities."

Langer, Selikoff and Kretchmer ended up on a J&J list of "antagonistic personalities" in a Nov. 29, 1972, memo, which described Selikoff as the leader of the "attack on talc."

"I suppose I was antagonistic," Langer told Reuters. Even so, in a subsequent test of J&J powders in 1976, he didn't find asbestos – a result that Mount Sinai announced.

SPREADING THE WORD: Jerome Kretchmer was New York City's environmental protection chief when he announced that the Mount Sinai research team had found what appeared to be asbestos in two unidentified brands of cosmetic talc. REUTERS/Jeenah Moon

Langer said he told J&J lawyers who visited him last year that he stood by all of his findings. J&J has not called him as a witness.

Selikoff died in 1992. Kretchmer said he recently read that a jury had concluded that Baby Powder was contaminated with asbestos. "I said to myself, 'How come it took so long?' " he said.

In July 1971, meanwhile, J&J sent a delegation of scientists to Washington to talk to the FDA officials looking into asbestos in talcum powders. According to an FDA account of the meeting, J&J shared "evidence that their talc contains less than 1%, if any, asbestos."

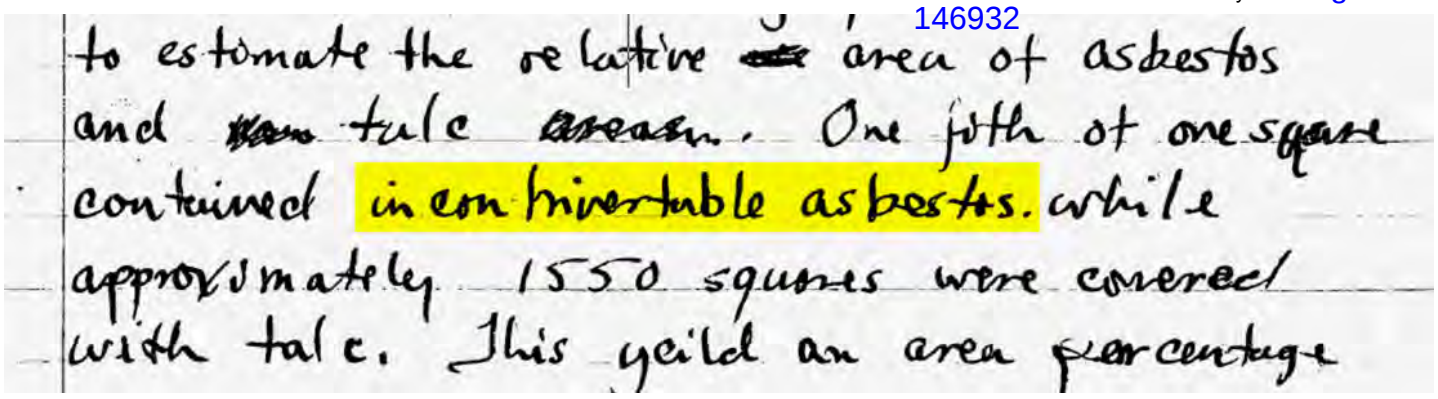
Later that month, Wilson Nashed, one of the J&J scientists who visited the FDA, said in a memo to the company's public relations department that J&J's talc contained trace amounts of "fibrous minerals (tremolite/actinolite)."

TOP TESTER: Irving Selikoff, who led the Mount Sinai team that investigated asbestos and talc, was also listed among J&J's "antagonistic personalities." Photo courtesy of Arthur Langer

As the FDA continued to investigate asbestos in talc, J&J sent powder samples to be tested at private and university labs. Though a private lab in Chicago found trace amounts of tremolite, it declared the amount "insignificant" and the samples "substantially free of asbestiform material." J&J reported that finding to the FDA under a cover letter that said the "results clearly show" the samples tested "contain no chrysotile asbestos." J&J's lawyer told Reuters the tremolite found in the samples was not asbestos.

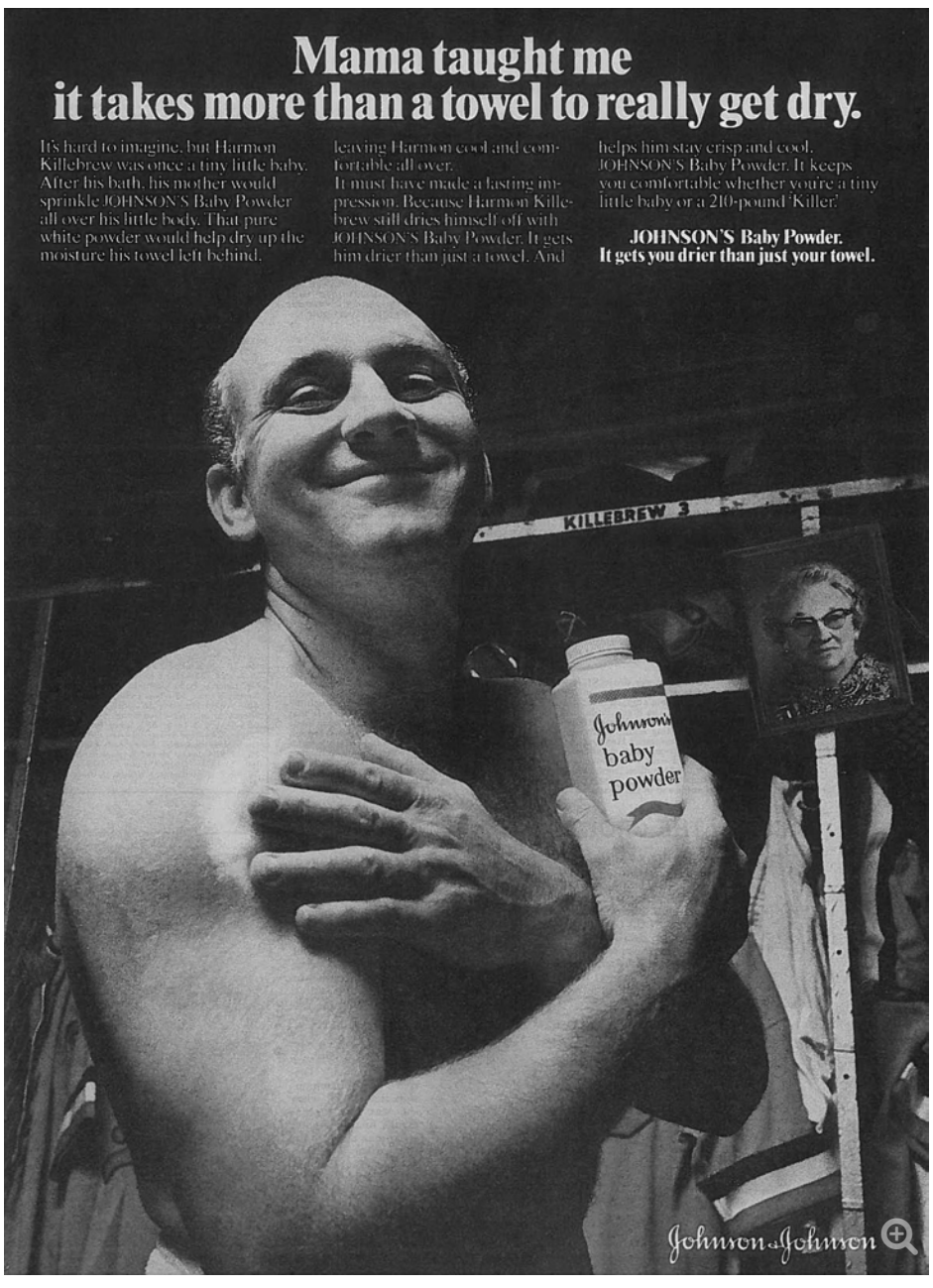
But J&J's FDA submission left out University of Minnesota professor Thomas E. Hutchinson's finding of chrysotile in a Shower to Shower sample – "incontrovertible asbestos," as he described it in a lab note.

## 1972


to estimate the relative area of asbestos and talc areas. One fifth of one square contained incontrovertible asbestos. while approximately 1550 squares were covered with talc. This yeild an area percentage

NO DOUBT: In a lab note, a University of Minnesota professor recorded finding “incontrovertible asbestos” in a sample of J&J’s Shower to Shower talc.

The FDA’s own examinations found no asbestos in J&J powder samples in the 1970s. Those tests, however, did not use the most sensitive detection methods. An early test, for example, was incapable of detecting chrysotile fibers, as an FDA official recognized in a J&J account of an Aug. 11, 1972, meeting with the agency: “I understand that some samples will be passed even though they contain such fibers, but we are willing to live with it.”




1972: Baseball Hall of Fame slugger Harmon Killebrew plugs Baby Powder.

By 1973, Tom Shelley, director of J&J’s Central Research Laboratories in New Jersey, was looking into acquiring patents on a process that a British mineralogist and J&J consultant was developing to separate talc from tremolite.

“It is quite possible that eventually tremolite will be prohibited in all talc,” Shelley wrote on Feb. 20, 1973, to a British colleague. Therefore, he added, the “process may well be valuable property to us.”

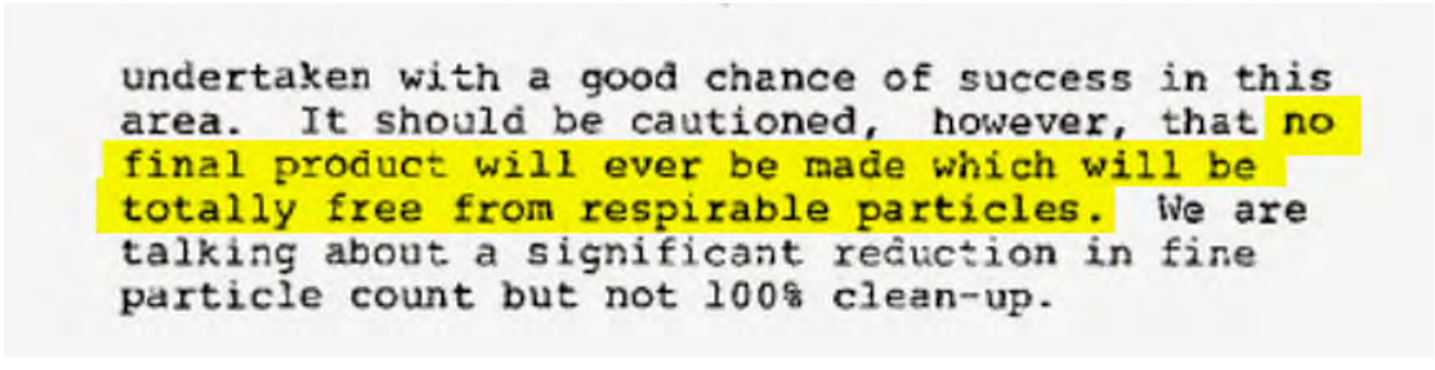
At the end of March, Shelley recognized the sensitivity of the plan in a memo sent to a J&J lawyer in New Jersey: “We will want to carefully consider the … patents re asbestos in talc. It’s quite possible that we may wish to keep the whole thing confidential rather than allow it to be published in patent form and thus let the whole world know.”

J&J did not obtain the patents.

While Shelley was looking into the patents, J&J research director DeWitt Petterson visited the company’s Vermont mining operation. “Occasionally, sub-trace quantities of tremolite or actinolite are identifiable,” he wrote in an April 1973 report on the visit. “And these might be classified as asbestos fiber.”

J&J should “protect our powder franchise” by eliminating as many tiny fibers that can be inhaled in airborn talc dust as possible, Petterson wrote. He warned, however, that “no final product will ever be made which will be totally free from respirable particles.” Introducing a cornstarch version of Baby Powder, he noted, “is obviously another answer.”

**1973**


undertaken with a good chance of success in this area. It should be cautioned, however, that no final product will ever be made which will be totally free from respirable particles. We are talking about a significant reduction in fine particle count but not 100% clean-up.

UNACHIEVABLE: J&J research director DeWitt Petterson warned the company that producing pure talc was impossible.

Bicks told Reuters that J&J believes that the tremolite and actinolite Petterson cited were not asbestos.

Cornstarch came up again in a March 5, 1974, report in which Ashton, the J&J talc supply chief, recommended that the company research that alternative "for defensive reasons" because "the thrust against talc has centered primarily on biological problems alleged to result from the inhalation of talc and related mineral particles."

## "We may have problems"

A few months after Petterson's recognition that talc purity was a pipe dream, the FDA proposed a rule that talc used in drugs contain no more than 0.1 percent asbestos. While the agency's cosmetics division was considering similar action on talcum powders, it asked companies to suggest testing methods.

At the time, J&J's Baby Powder franchise was consuming 20,000 tons of Vermont talc a year. J&J pressed the FDA to approve an X-ray scanning technique that a company scientist said in an April 1973 memo allowed for "an automatic 1% tolerance for asbestos." That would mean talc with up to 10 times the FDA's proposed limit for asbestos in drugs could pass muster.

The same scientist confided in an Oct. 23, 1973, note to a colleague that, depending on what test the FDA adopted for detecting asbestos in cosmetic talc, "we may have problems."

The best way to detect asbestos in talc was to concentrate the sample and then examine it through microscopes, the Colorado School of Mines Research Institute told J&J in a Dec. 27, 1973, report. In a memo, a J&J lab supervisor said the concentration technique, which the company's own researchers had earlier used to identify a "tremolite-type" asbestos in Vermont talc, had one limitation: "It may be too sensitive."

> **"No mother was going to powder her baby with 1% of a known carcinogen irregardless of the large safety factor."**
>
> An FDA official commenting in 1975 on the talc testing method J&J backed

In his email to Reuters, J&J's lawyer said the lab supervisor's concern was that the test would result in "false positives," showing asbestos where there was none.

J&J also launched research to find out how much powder a baby was exposed to during a diapering and how much asbestos could be in that powder and remain within OSHA's new workplace exposure limits. Its researchers had strapped an air sampling device to a doll to take measurements while it was powdered, according to J&J memos and the minutes of a Feb. 19, 1974, meeting of the Cosmetic Toiletry and Fragrance Association (CTFA), an industry group.

"It was calculated that even if talc were pure asbestos the levels of exposure of a baby during a normal powdering are far below the accepted tolerance limits," the minutes state.

In a Sept. 6, 1974, letter, J&J told the FDA that since "a substantial safety factor can be expected" with talc that contains 1 percent asbestos, "methods capable of determining less than 1% asbestos in talc are not necessary to assure the safety of cosmetic talc."

Not everyone at the FDA thought that basing a detection method on such a calculation was a good idea. One official called it "foolish," adding, according to a J&J account of a February 1975 meeting: "No mother was going to powder her baby with 1% of a known carcinogen irregardless of the large safety factor."

## "Misrepresentation by omission"

Having failed to persuade the FDA that up to 1 percent asbestos contamination was tolerable, J&J began promoting self-policing as an alternative to regulation. The centerpiece of this approach was a March 15, 1976, package of letters from J&J and other manufacturers that the CTFA gave to the agency to show that they had succeeded at eliminating asbestos from cosmetic talc.

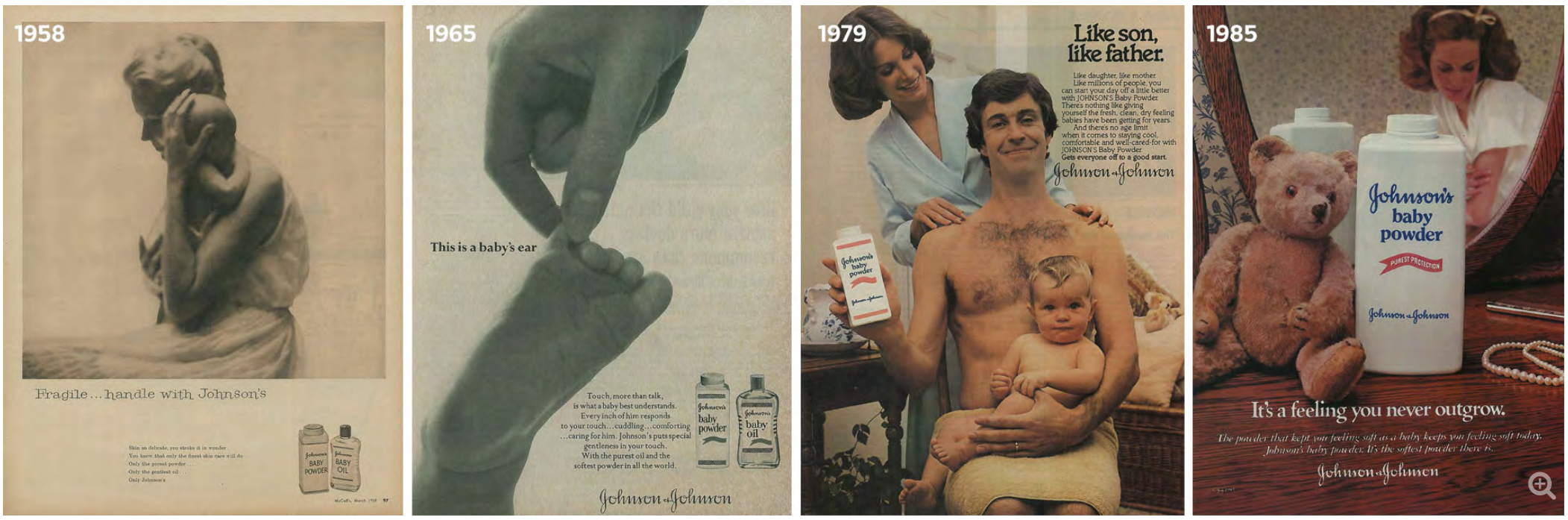
"The attached letters demonstrate responsibility of industry in monitoring its talcs," the cover letter said. "We are certain that the summary will give you assurance as to the freedom from contamination by asbestos for materials of cosmetic talc products."

In its letter, J&J said samples of talc produced between December 1972 and October 1973 were tested for asbestos, and none was detected "in any sample."

J&J didn't tell the FDA about a 1974 test by a professor at Dartmouth College in New Hampshire that turned up asbestos in talc from J&J – "fiberform" actinolite, as he put it. Nor did the company tell the FDA about a 1975 report from its longtime lab that found particles identified as "asbestos fibers" in five of 17 samples of talc from the chief source mine for Baby Powder. "Some of them seem rather high," the private lab wrote in its cover letter.

Bicks, the J&J lawyer, said the contract lab's results were irrelevant because the talc was intended for industrial use. He said the company now believes that the actinolite the Dartmouth professor found "was not asbestiform," based on its interpretation of a photo in the original lab report.

Just two months after the Dartmouth professor reported his findings, Windsor Minerals Research and Development Manager Vernon Zeitz wrote that chrysotile, "fibrous anthophyllite" and other types of asbestos had been "found in association with the Hammondsville ore body" – the Vermont deposit that supplied Baby Powder talc for more than two decades.




FOR EVERYONE: For decades, J&J has promoted its iconic Baby Powder as a safe, gentle product for babies and adults alike.

Zeitz's May 1974 report on efforts to minimize asbestos in Vermont talc "strongly urged" the adoption of ways to protect "against what are currently considered to be materials presenting a severe health hazard and are potentially present in all talc ores in use at this time."

Bicks said that Zeitz was not reporting on actual test results.

The following year, Zeitz reported that based on weekly tests of talc samples over six months, "it can be stated with a greater than 99.9% certainty that the ores and materials produced from the ores at all Windsor Mineral locations are free from asbestos or asbestiform minerals."

J&J's selective use of test results figured in a New Jersey judge's decision this year to affirm the first verdict against the company in a case claiming asbestos in J&J products caused cancer. "Providing the FDA favorable results showing no asbestos and withholding or failing to provide unfavorable results, which show asbestos, is a form of a misrepresentation by omission," Middlesex County Superior Court Judge Ana Viscomi said in her June ruling.

"J&J respectfully disagrees with the Judge's comments," Bicks said. "J&J did not withhold any relevant testing from FDA."

The FDA declined to comment on the ruling.

Lacking consensus on testing methods, the FDA postponed action to limit asbestos in talc. Years later, it did set limits on asbestos in talc used in drugs. It has never limited asbestos in cosmetic talc or established a preferred method for detecting it.

Instead, in 1976, a CTFA committee chaired by a J&J executive drafted voluntary guidelines, establishing a form of X-ray scanning with a 0.5 percent detection limit as the primary test, the method J&J preferred. The method is not designed to detect the most commonly used type of asbestos, chrysotile, at all. The group said the more sensitive electron microscopy was impractical.

The CTFA, which now does business as the Personal Care Products Council, declined to comment.

X-ray scanning is the primary method J&J has used for decades. The company also periodically requires the more sensitive checks with electron microscopes. J&J's lawyer said the company's tests exceed the trade association standard, and they do. He also said that today, J&J's X-ray scans can detect suspect minerals at levels as low as 0.1 percent of a sample.

But the company never adopted the Colorado lab's 1973 recommendation that samples be concentrated before examination under a microscope. And the talc samples that were subjected to the most sensitive electron microscopy test were a tiny fraction of what was sold. For those and other reasons, J&J couldn't guarantee its Baby Powder was asbestos-free when plaintiffs used it, according to experts, including some who testified for plaintiffs.

As early as 1976, Ashton, J&J's longtime talc overseer, recognized as much in a memo to colleagues. He wrote that talc in general, if subjected to the most sensitive testing method, using concentrated samples, "will be hard pressed in supporting purity claims." He described this sort of testing as both "sophisticated" and "disturbing."

By 1977, J&J appeared to have tamped down concerns about the safety of talc. An internal August report on J&J's "Defense of Talc Safety" campaign noted that independent authorities had deemed cosmetic talc products to be "free of hazard." It attributed "this growing opinion" to the dissemination to scientific and medical communities in the United States and Britain of "favorable data from the various J&J sponsored studies."

Actress Blair Brown touts Baby Powder in this 1970s-era TV commercial

In 1984, FDA cosmetics chief and former J&J employee Heinz Eiermann reiterated that view. He told the New York Times that the agency's investigation a decade earlier had prompted the industry to ensure that talc was asbestos-free. "So in subsequent analyses," he told the paper, "we really could not identify asbestos or only on very rare occasions."

Two years later, the FDA rejected a citizen request that cosmetic talc carry an asbestos warning label, saying that even if there were trace contamination, the use of talc powder during two years of normal diapering would not increase the risk of cancer.

In 1980, J&J began offering a cornstarch version of Baby Powder – to expand its customer base to people who prefer cornstarch, the company says.

The persistence of the industry's view that cosmetic talc is asbestos-free is why no studies have been conducted on the incidence of mesothelioma among users of the products. It's also partly why regulations that protect people in mines, mills, factories and schools from asbestos-laden talc don't apply to babies and others exposed to cosmetic talc – even though Baby Powder talc has at times come from the same mines as talc sold for industrial use. J&J says cosmetic talc is more thoroughly processed and thus purer than industrial talc.

Until recently, the American Cancer Society (ACS) accepted the industry's position, saying on its website: "All talcum products used in homes have been asbestos-free since the 1970s."

After receiving inquiries from Reuters, the ACS in early December revised its website to remove the assurance that cosmetic talcs are free of asbestos. Now, it says, quoting the industry's standards, that all cosmetic talc products in the United States "should be free from detectable amounts of asbestos."

The revised ACS web page also notes that the World Health Organization's International Agency for Research on Cancer classifies talc that contains asbestos as "carcinogenic to humans."

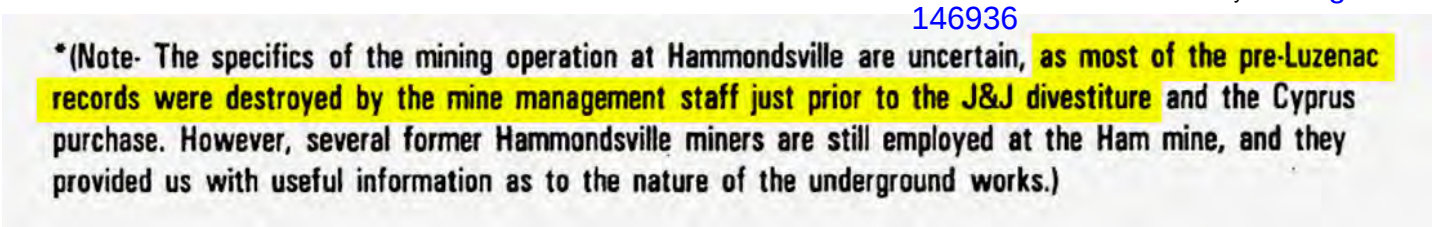
Despite the success of J&J's efforts to promote the safety of its talc, the company's test lab found asbestos fibers in samples taken from the Vermont operation in 1984, 1985 and 1986. Bicks said: "The samples that we know of during this time period that contained a fiber or two of asbestos were not cosmetic talc samples."

Then, in 1992, three years after J&J sold its Vermont mines, the new owner, Cyprus Minerals, said in an internal report on "important environmental issues" in its talc reserves that there was "past tremolite" in the Hammondsville deposit. Hammondsville was the primary source of Baby Powder talc from 1966 until its shutdown in 1990.

Bicks rejected the Cyprus report as hearsay, saying there is no original documentation to confirm it. Hammondsville mine records, according to a 1993 J&J memo, "were destroyed by the mine management staff just prior to the J&J divestiture."

Bicks said the destroyed documents did not include talc testing records.

## 1993



*(Note- The specifics of the mining operation at Hammondsville are uncertain, as most of the pre-Luzenac records were destroyed by the mine management staff just prior to the J&J divestiture and the Cyprus purchase. However, several former Hammondsville miners are still employed at the Ham mine, and they provided us with useful information as to the nature of the underground works.)

MISSING: A J&J memo reveals that records of the Hammondsville mine, the main source of Baby Powder talc from 1966 until 1990, were destroyed by mine managers while J&J still owned the business.

In 2002 and 2003, Vermont mine operators found chrysotile asbestos fibers on several occasions in talc produced for Baby Powder sold in Canada. In each case, a single fiber was recorded – a finding deemed "BDL" – below detection limit. Bicks described the finding as "background asbestos" that did not come from any talc source.

In 2009, the FDA, responding to growing public concern about talc, commissioned tests on 34 samples, including a bottle of J&J Baby Powder and samples of Imerys talc from China. No asbestos was detected.

FDA Commissioner Scott Gottlieb said the agency continues to receive a lot of questions about talc cosmetics. "I recognize the concern," he told Reuters. He said the agency's policing of cosmetics in general – fewer than 30 people regulating a "vast" industry – was "a place where we think we can be doing more."

Gottlieb said the FDA planned to host a public forum in early 2019 to "look at how we would develop standards for evaluating any potential risk." An agency spokeswoman said that would include examining "scientific test methods for assessment of asbestos."

## "Fishing expedition"

Before law school, Herschel Hobson worked at a rubber plant. There, his job included ensuring that asbestos in talc the workers were exposed to didn't exceed OSHA limits.

That's why he zeroed in on Johnson's Baby Powder after he took on Darlene Coker as a client in 1997. The lawsuit Coker and her husband, Roy, filed that year against J&J in Jefferson County District Court in Beaumont, Texas, is the earliest Reuters found alleging Baby Powder caused cancer.

Hobson asked J&J for any research it had into the health of its mine workers; talc production records from the mid-1940s through the 1980s; depositions from managers of three labs that tested talc for J&J; and any documents related to testing for fibrous or asbestiform materials.

J&J objected. Hobson's "fishing expedition" would not turn up any relevant evidence, it asserted in a May 6, 1998, motion. In fact, among the thousands of documents Hobson's request could have turned up was a letter J&J lawyers had received only weeks earlier from a Rutgers University geologist confirming that she had found asbestos in the company's Baby Powder, identified in her 1991 published study as tremolite "asbestos" needles.

Hobson agreed to postpone his discovery demands until he got the pathology report on Coker's lung tissue. Before it came in, J&J asked the judge to dismiss the case, arguing that Coker had "no evidence" Baby Powder caused mesothelioma.

Ten days later, the pathology report landed: Coker's lung tissue contained tens of thousands of "long fibers" of four different types of asbestos. The findings were "consistent with exposure to talc containing chrysotile and tremolite contamination," the report concluded.

"The asbestos fibers found raise a new issue of fact," Hobson told the judge in a request for more time to file an opposition to J&J's dismissal motion. The judge gave him more time but turned down his request to resume discovery.

Without evidence from J&J and no hope of ever getting any, Hobson advised Coker to drop the suit.

Hobson is still practicing law in Nederland, Texas. When Reuters told him about the evidence that had emerged in recent litigation, he said: "They knew what the problems were, and they hid it." J&J's records would have made a "100% difference" in Coker's case.

Had the information about asbestos in J&J's talc come out earlier, he said, "maybe there would have been 20 years less exposure" for other people.

Bicks, the J&J lawyer, said Coker dropped her case because "the discovery established that J&J talc had nothing to do with Plaintiff's disease, and that asbestos exposure from a commercial or occupational setting was the likely cause."

Coker never learned why she had mesothelioma. She did beat the odds, though. Most patients die within a year of diagnosis. Coker held on long enough to see her two grandchildren. She died in 2009, 12 years after her diagnosis, at age 63.

Coker's daughter Crystal Deckard was 5 when her sister, Cady, was born in 1971. Deckard remembers seeing the white bottle of Johnson's Baby Powder on the changing table where her mother diapered her new sister.

"When Mom was given this death sentence, she was the same age as I am right now," Deckard said. "I have it in the back of my mind all the time. Could it happen to us? Me? My sister?"

NO SATISFACTION: Lacking the evidence she needed, Darlene Coker, here with one of her doctors, died without ever finding out what caused her mesothelioma. Cady Evans/Handout via REUTERS

# A guiding hand on talc safety research

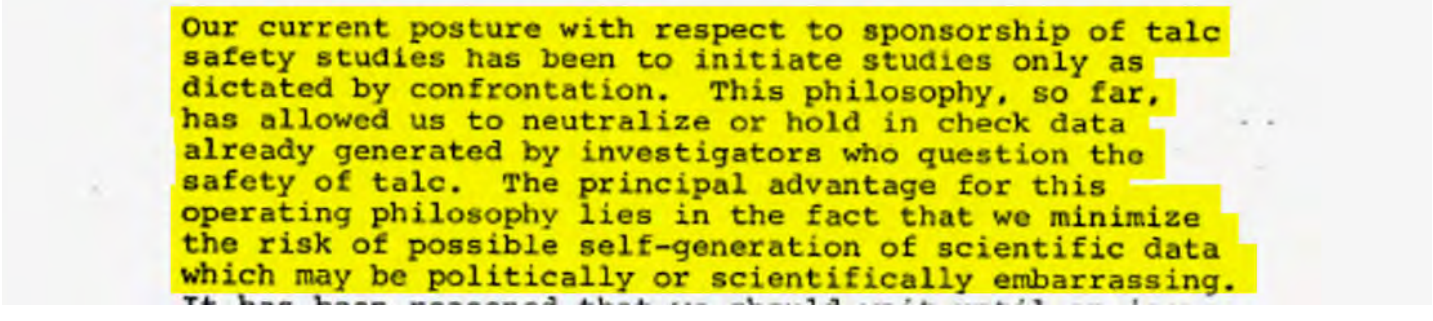
By LISA GIRION

Johnson & Johnson developed a strategy in the 1970s to deal with a growing volume of research showing that talc miners had elevated rates of lung disease and cancer: Promote the positive, challenge the negative.

That approach was summed up by a J&J applied research director in a "strictly confidential" March 3, 1975, memo to managers of the baby products division, which used the talc in J&J's signature Baby Powder.

"Our current posture with respect to the sponsorship of talc safety studies has been to initiate studies only as dictated by confrontation," the memo said. "This philosophy, so far, has allowed us to neutralize or hold in check data already generated by investigators who question the safety of talc."

**1973**


Our current posture with respect to sponsorship of talc safety studies has been to initiate studies only as dictated by confrontation. This philosophy, so far, has allowed us to neutralize or hold in check data already generated by investigators who question the safety of talc. The principal advantage for this operating philosophy lies in the fact that we minimize the risk of possible self-generation of scientific data which may be politically or scientifically embarrassing.

A J&J executive laid out the company's policy of countering negative research about the health effects of talc in a memo to managers.

Also, the memo said, "we minimize the risk of possible self-generation of scientific data which may be politically or scientifically embarrassing."

J&J's effort to protect its iconic Baby Powder franchise by shaping research was led by physician and scientist executives. An early 1970s study of 1,992 Italian talc miners shows how it worked: J&J commissioned and paid for the study, told the researchers the results it wanted, and hired a ghostwriter to redraft the article that presented the findings in a journal.

The effort entailed other attempts to influence research, including a U.S. government study of the health of talc workers in Vermont. J&J's Windsor Minerals Inc subsidiary, one of several mine operators involved in the study, developed a relationship with the U.S. National Institute of Occupational Safety and Health researchers to "even influence the conclusions" through suggestions of "subjective interpretations," according to a 1973 Windsor Minerals memo.

Peter Bicks, outside counsel for J&J, told Reuters in an email that for the Vermont study, company "representatives acted in an 'educational and advisory capacity' to provide the researchers with a realistic study plan."

A 1979 article in the Journal of Environmental Pathology and Toxicology detailing the findings of the study was not good news for talc. It reported a "significant increase" in "respiratory cancer mortality" among miners. A subsequent analysis of the underlying data published in 1988 determined that at least one of the workers died of mesothelioma, the cancer most closely

associated with asbestos.

The proposal to study the health of miners of the Italian talc used in Baby Powder for decades came from William Ashton, J&J's longtime talc supply chief. Ashton had obtained a summary of miners' medical records compiled by an Italian physician, who also happened to control the country's talc exports.

J&J should use those records "for maximum benefit," Ashton said in a May 8, 1973, letter to Dr Gavin Hildick-Smith, J&J's director of medical affairs. "It seems to me that the Italian records give us the opportunity to fortify a position on talc safety."

At the time, the U.S. Food and Drug Administration was considering a limit on asbestos in talcs. In an Oct. 18, 1973, memo, Hildick-Smith advised J&J: "The risk/benefit ratio of conducting an epidemiological study in these mines must be considered."

By early 1974, the study was a go. Hildick-Smith sent money to the Italian talc exporter-physician to hire a team of researchers. Hildick-Smith told the lead researcher in a June 26, 1974, letter exactly what J&J wanted: data that "would show that the incidence of cancer in these subjects is no different from that of the Italian population or the rural control group."

That is exactly what J&J got, Hildick-Smith told colleagues a few months later. At a meeting on Sept. 27, 1974, for a "Talc/powder Safety Studies Review," he reported the Italian study would dispel the "cancer concern associated with exposure to talc."

The following spring, Hildick-Smith got a draft of the Italian study from the lead researcher. It needed work to meet the "form and style" requirements of the target journal, he told colleagues in a March 31, 1975, memo. He added that he would send it to a scientific ghostwriter "who will hold it in confidence and rewrite it."

The article that appeared in 1976 in the Journal of Occupational and Environmental Medicine reported results even better than J&J had bargained for. The study found fewer lung cancer deaths than expected, a result that the authors said supported "the thesis of no cancerogenic effect attributable to pure talc."



It also found no mesothelioma, the signature cancer of asbestos exposure. There is no evidence J&J manipulated or misused the data. Experts for plaintiffs have testified that the Italian study was too small to draw any conclusions about the incidence of such a rare cancer. J&J's expert witnesses have concluded the opposite.

Bicks noted that the Italian study has been updated three times – in 1979, 2003 and 2017 – "confirming the lack of association between exposure to asbestos-free talc, lung cancer and mesothelioma."

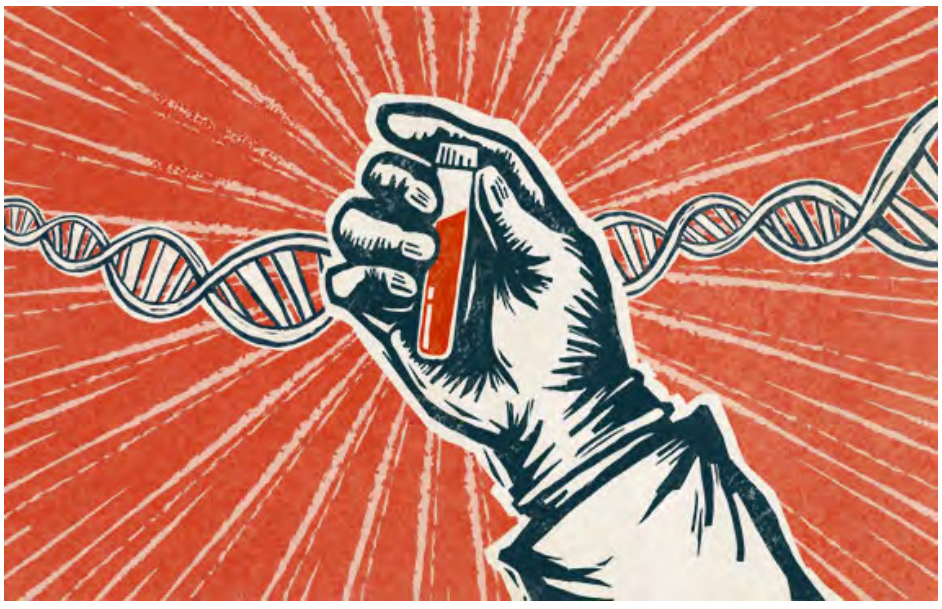
J&J got a lot of mileage out of the study. It was cited in a review article titled "The Biology of Talc," published Nov. 1, 1976, in the British Journal of Industrial Medicine. In addition to dozens of published studies, the review cited unpublished research, including one experiment that used a doll as a proxy for infants and that supported the company's position on the safety of talc. It didn't disclose that J&J had commissioned the unpublished research.

The author of the review article concluded that the "concern that has been expressed about the possible health hazard from consumer exposure to cosmetic talc is unwarranted … There is no evidence that its normal use poses a hazard to health."

The author was Hildick-Smith, the J&J physician executive who had overseen the Italian study and played a key role in the company's talc safety research. The article did not disclose his J&J connection, identifying him only as a Rutgers University clinical assistant professor. Hildick-Smith died in 2006.

**Powder Keg**
By Lisa Girion
Photo editing: Steve McKinley
Video: Zachary Goelman, Jane Lee, Mike Wood and Krystian Orlinski
Design: Troy Dunkley
Edited by Janet Roberts and John Blanton

OTHER REUTERS INVESTIGATIONS



## Baby Biocode

A prenatal test used worldwide sends gene data of pregnant women to the company that developed it with China's military. The U.S. sees a security risk.

## The Muqtada Moment

The political movement of nationalist Shi'ite cleric Muqtada al-Sadr has quietly come to dominate the apparatus of the Iraqi state. This growing influence could pose problems for the U.S. and Iran.


## Politically Incorrect

The bank got in trouble over a high-stakes U.S.-China legal clash. In the past two years, Chinese state-owned firms have ended or cut back business with HSBC.

## Loss Upon Loss

With vaccinations lagging, a vicious COVID-19 variant cut through three generations of the Cunha family. Within the space of six weeks, four would die.

# EXHIBIT L

**JNJ000024462-JNJ000024463**

ALFRED P. WEHNER, D.M.D., SC.D., CAND. MED.
DIPLOMATE, ACADEMY OF TOXICOLOGICAL SCIENCES
312 SAINT STREET
RICHLAND, WASHINGTON 99352

9/17/97

Mr.Michael R.Chudkowski
Manager, Preclinical Toxicology
J&J Consumer Products,Inc.
Skillman, NJ 08558-9418

Dear Mike:

There is a German saying which translates as follows:

"A true friend is not he who beguiles you with flattery
but he who discloses to you your mistakes
before your enemies discover them."

In this spirit I would like to volunteer a critique of the three CTFA response statements which you faxed me on September 11. Some of the wording leaves CTFA wide open to counter-attack. The most harmless response statement of the three is the one dated July 1,1992. It does not give the names of the authors and the title of the paper to which the response is being made. More important, I believe that different and/or additional more powerful statements along the lines of my critique faxed to Jerry McEwen, as far as applicable to the situation in 1992, would have put CTFA in a more advantageous tactical position. Several investigators have independently reported talc particles in ovarian tissue. Simply citing the Battelle study and stating that it "demonstrated that talc does not translate (sic!) through the cervix to the uterine cavity and beyond" does not address the problem, does not refute these findings, and therefore does not serve CTFA's best interest. All in all, in my opinion an inept response.

The problem with the response statement dated July 8,1992, is more serious. The last sentence in the second paragraph states: "Finally, human studies on talc and cancer in industrial settings have shown that industrial exposure to talc, both by skin contact and inhalation, even at levels thousands of times higher than lifetime consumer exposure, presents no significant risk." This statement is outright false. All an Epstein, a Kennedy, or one of their aides knowledgeable in matters talc, would have to do at a hearing (or any occasion, at that) to demolish the credibility of the talc industry is to refer to the studies by Kleinfeld et al, Thomas, and Thomas and Stewart!

Referring in a 1992 statement to a 1977 editorial in defense of one's position is not a very persuasive argument. Much can happen in 15 years.

509/375-0873 FAX 509/375-5693

Here, too, I believe that more powerful and better defendable arguments could and should have been made on behalf of the industry.

The response statement dated November 17, 1994, is just as bad. The second sentence in the third paragraph reads: "The workshop concluded that, although some of these studies suggested a weak association might exist, when taken together the results of the studies are insufficient to demonstrate any real association." This statement is also inaccurate, to phrase it euphemistically. At that time there had been about 9 studies (more by now) published in the open literature that did show a statistically significant association between hygienic talc use and ovarian cancer. Anybody who denies this risks that the talc industry will be perceived by the public like it perceives the cigarette industry: denying the obvious in the face of all evidence to the contrary. This would be a particularly tragic misperception in view of the fact that the industry does have powerful, valid arguments to support its position.

The workshop did not conclude that "the results of the studies are insufficient to demonstrate any real association." As pointed out above, a "real" statistically significant association has been undeniably established independently by several investigators, which without doubt will be readily attested to by a number of reputable scientists/clinicians, including Bernard Harlow, Debra Novotny, Candace Sue Kasper, Debra Heller, and others. What the workshop panel did conclude was that (1) the results of the studies were ambiguous, inconsistent, contradictory and therefore inconclusive, (2) therefore hygienic use of cosmetic talc does not present a risk to the consumer. So why not use these powerful and irrefutable arguments (plus some of those along the lines of my fax to Rich) instead of questionable mush that leaves one vulnerable to counterattack? The following sentence states: "In addition there is no basis to conclude that talc is capable of migrating to the ovaries...". I submit that several reports, independently describing talc particles in/on ovarian tissue, along with other suggestive evidence (questionable as some of it might be) does provide a basis for just such a conclusion. My point is that such a complex and vexing issue cannot be credibly dismissed with one sweeping statement without any documenting references.

Mike, I realize that CTFA is not J&J. However, I believe that a defeat or embarrassment of CTFA also negatively affects J&J to some extent. As a consultant on a retainer I feel obligated to proactively act in the best interest of my client at all times, not only when I am approached with a specific assignment. This consideration alone motivated me to spend the time to bring my thoughts on this matter to your attention. I trust that in the process I did not step on anybody's toes.

Best regards

Al

# EXHIBIT M

NICHOLS • DEZENHALL

the leader in crisis management and high stakes communications

# CONFIDENTIAL MEMORANDUM

**TO:** Irene Malbin

**FROM:** Eric Dezenhall, Elena Solovyov

**SUBJ:** Proposal: Defending Cosmetic Talc

**DATE:** October 27, 2000

As you know, over the years, we've stood shoulder-to-shoulder with CTFA and its members in the unbending defense of the safety of several cosmetics ingredients. More often than not, together, we've prevailed. Like you, we have never shied away from a tough battle, and we're not going to start now. We're with you on this 100 percent of the way.

There comes a time, however, when it is essential that – together – we fully assess and appreciate what we are up against. While the objective of our forthcoming effort – to vigorously defend the safety of talc's use in cosmetics products – is not in question, we need to be mindful of the following:

- A federally funded scientific organization may declare cosmetic talc as "reasonably anticipated to be a human carcinogen." Their draft report focuses on talc powder use in perineal area and on sanitary napkins. That's an alarming, if scientifically flimsy, declaration.
- Potential consumer outrage over its continued use in products used with babies and for female hygiene purposes may go off the charts.
- Consumer group, media and potentially regulatory pressure to transition out of talc use – given that there is an alternative – may be overwhelming.
- The legal liabilities of continuing sales of talc-based products, not to mention Prop 65 implications, are profound. In California, once an ingredient is declared a human carcinogen it, by law, should be listed as such on the label.
- Pediatricians and gynecologists have been advocating the use of cornstarch powder for years and now will become more vocal in their concerns about talc.

We could go on and on in laying out the negatives, but bottom-line – except for a very few number of recruited scientific experts – the cosmetics industry will be a lone voice in handling a very tough issue. This doesn't diminish one bit our will to fight, but it should shape our expectations on what to expect, and it should influence potential contingencies as events unfold. It also serves to remind us that the relative regulatory freedom of the cosmetics industry depends, in large part, on the hard won perception that it takes self-policing action when confronted with credible information about an ingredient safety issue.

As always, it is up to the manufacturers to make their own decisions about talc use in their products, and to guide your and our efforts. They should be informed, however, if they do not already know, that consumer group and media attacks – featuring their products – could get nasty very quickly. They need to have their own plans in place. It would not be unwise for companies marketing talc-based products for use with babies and infants to consider ways to reformulate if necessary.

Attached is a recommended action plan to do everything we can (within your budget parameters) to work with CTFA and its members to maintain consumer confidence in cosmetics products that include talc. As always, we are fully committed to working with CTFA and the industry to prevent a consumer scare and to allow the continued marketing of these products. But let us all be clear on what we're up against.

# EXHIBIT N

OUR COMPANY

# Johnson & Johnson Consumer Health Announces Discontinuation of Talc-based Johnson's Baby Powder in U.S. and Canada

May 19, 2020

As part of a portfolio assessment related to COVID-19, in March, Johnson & Johnson Consumer Health stopped shipping hundreds of items in the U.S. and Canada to prioritize high-demand products and to allow for appropriate social distancing in manufacturing and distribution facilities during this unprecedented pandemic. Following this action, the Company has now decided to permanently discontinue approximately 100 SKUs from the March assessment, as well as talc-based Johnson's Baby Powder. This discontinuation is only effective in the U.S. and Canada. Johnson's Baby Powder represents approximately 0.5% of the total U.S. Consumer Health business.

Demand for talc-based Johnson's Baby Powder in North America has been declining due in large part to changes in consumer habits and fueled by misinformation around the safety of the product and a constant barrage of litigation advertising.

Johnson & Johnson remains steadfastly confident in the safety of talc-based Johnson's Baby Powder. Decades of scientific studies by medical experts around the world support the safety of our product. We will continue to vigorously defend the product, its safety, and the unfounded allegations against it and the Company in the courtroom. All verdicts against the Company that have been through the appeals process have been overturned.

The Company will wind down the commercialization of talc-based Johnson's Baby Powder in the U.S. and Canada in the coming months. Existing inventory will continue to be sold through retailers until it runs out. Cornstarch-based Johnson's Baby Powder will remain available in North America. Both types of Johnson's Baby Powder – talc-based and cornstarch-based – will continue to be sold in other markets around the world where there is significantly higher consumer demand for the product. Importantly, Johnson & Johnson remains fully committed to its Johnson's Baby brand.

# EXHIBIT O

OUR COMPANY

# Company Investigation Confirms No Asbestos in Johnson's Baby Powder

*More Than 150 Tests Show No Asbestos*

**NEW BRUNSWICK, NJ, (December 3, 2019) –** Johnson & Johnson Consumer Inc. (the Company) today reaffirmed that its Johnson's Baby Powder is safe and free of asbestos after a comprehensive investigation into the United States Food and Drug Administration's (FDA) earlier reported finding of sub-trace levels of asbestos (no greater than 0.00002%) in samples from a single bottle of Johnson's Baby Powder.

Tests conducted by two third-party labs show asbestos was not present in the single bottle that FDA's contracted lab, AMA Analytical Services, Inc. (AMA), tested, nor was it present in retained samples of the finished lot from which the bottle was produced. Additionally, the Company's investigation revealed that the testing protocol at AMA deviated from standard practice and that AMA did not execute a full asbestos confirmation as required by their lab's test method.

The Company's investigation concluded that the most probable root causes for the FDA's reported results were either test sample contamination and/or analyst error at the AMA lab.

The Company stated: "Our talc is safe and asbestos free, and these 150-plus tests, and the tests we routinely do to ensure the quality and safety of our talc-based products, are consistent with the results from renowned independent research labs over the past 40 years."

Over the course of the investigation, a total of 155 tests were conducted by two different third-party labs using four different testing methods on samples from the same bottle tested by AMA, the recalled lot of Johnson's Baby Powder, as well as three lots manufactured before the recalled lot and three lots manufactured after the recalled lot. All results confirm there is no asbestos in our talc. The results of 63 of these tests were released on October 29, and the Company today released the results of the 92 subsequent tests. Other than test sample contamination and/or analyst error at the AMA lab, there is no viable explanation for AMA's positive results in two out of three samples it tested, as compared to 32 third-party tests on samples from the same bottle finding no asbestos.

The Company has ruled out the mine and manufacturing supply chain as root causes for AMA's sub-trace asbestos findings. In its investigation, the Company also confirmed that the milling and mixing of Johnson's Baby Powder results in a uniform product, ensuring that its testing would reveal asbestos if it was present in the product.

The Company's investigation into AMA's test results has now concluded. The Company has shared its findings with the FDA and continues to work with the Agency in support of consumer safety.

The Company has now posted the results of all 155 tests, the complete AMA report as received from the FDA, and a summary of its investigation here. For more information about talc, visit FactsAboutTalc.com

Despite the conclusions of the investigation and the tests showing no asbestos in the bottle or lot, the previously announced recall of Lot #22318RB of Johnson's Baby Powder, stays in effect. The recall was made out of an abundance of caution and before an investigation could be conducted, and, once initiated, it is not feasible to halt the recall. If you have questions about the recall, contact the Johnson & Johnson Consumer Care Center at www.johnsonsbaby.com or by calling +1 (866) 565-2229.

For 133 years, the Johnson & Johnson Family of Companies have been committed to putting the needs and well-being of the people we serve first, and we will continue to do so.

**NOTE TO INVESTORS CONCERNING FORWARD-LOOKING STATEMENTS:**

This press release contains "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995 regarding the results of subsequent testing related to the voluntary recall of one lot of Johnson's Baby Powder. The reader is cautioned not to rely on these forward-looking statements. The forward-looking statements in this press release are based on current expectations of future events. If underlying assumptions prove inaccurate or known or unknown risks or uncertainties materialize, actual results could vary materially from the expectations and projections of Johnson & Johnson Consumer Inc. and/or Johnson & Johnson. Risks and uncertainties include, but are not limited to: product efficacy or safety concerns resulting in product recalls or regulatory action; significant adverse litigation or government action, including related to product liability claims; uncertainty of commercial success for new and existing products; the ability of the company to successfully execute strategic plans; manufacturing difficulties or delays, internally or within the supply chain; changes to applicable laws and regulations; changes in behavior and spending patterns of purchasers of health care products and services; and increased scrutiny of the health care industry by government agencies. A further list and descriptions of these risks, uncertainties and other factors can be found in Johnson & Johnson's Annual Report on Form 10-K for the fiscal year ended December 30, 2018, including in the sections captioned "Cautionary Note Regarding Forward-Looking Statements" and "Item 1A. Risk Factors," in the company's most recently filed Quarterly Report on Form 10-Q and in the company's subsequent filings with the Securities and Exchange Commission. Copies of these filings are available online at www.sec.gov, www.jnj.com or on request from Johnson & Johnson. Any forward-looking statement made in this release speaks only as of the date of this release. Neither Johnson & Johnson Consumer Inc. nor Johnson & Johnson undertakes to update any forward-looking statement as a result of new information or future events or developments. The Company expressly disclaims all liability in respect to actions taken or not taken based on any or all the contents of this press release.

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Johnson & Johnson

# EXHIBIT P

OUR COMPANY

# Federal Judge Excludes Certain Plaintiff Expert Testimony from Talc Ovarian Cancer Trials, Deeming Them Not Scientifically Sound

*Company is pleased with the limitations in plaintiff expert testimony and will continue to defend as decades of clinical evidence supports the safety of Johnson's Baby Powder*

**NEW BRUNSWICK, NJ – April 27, 2020:** Johnson & Johnson ("the Company") (NYSE: JNJ) today announced that U.S. District Judge Freda L. Wolfson, chief judge of the District of New Jersey, who is presiding over the federal multidistrict litigation (MDL) involving claims that Johnson's Baby Powder causes ovarian cancer, decided that certain plaintiff expert witnesses did not present scientifically sound evidence to support aspects of their opinions and therefore cannot present these theories before a jury.

The Company is pleased the decision did not limit the testimony of any of the Company's expert witnesses despite efforts by plaintiffs' lawyers to do so. Further, the Company is pleased that plaintiffs will have significant restrictions on what theories its experts can present before the jury. Importantly, Judge Wolfson limited the testimony of plaintiffs' asbestos testing expert, Dr. William Longo, and held that another expert, Dr. Ghassen Saed, cannot testify that his experiments showed that talc can cause ovarian cancer.

The *Daubert* decision is not a determination by the court on the validity of the plaintiff's allegations. Johnson & Johnson will continue to defend these lawsuits at trial, and plaintiffs must meet their burden of proof, including both general and specific causation, at any trial that may be scheduled. The Company is prepared to shine a light on the flaws in plaintiff experts' opinions in front of juries, just as it has in state court cases.

## SPECIFICS OF DAUBERT RULING

Among other findings, the opinion states that:

- According to Judge Wolfson, plaintiffs' key biology expert Dr. Ghassen Saed's opinion that "the use of talc causes ovarian cancer" is "unsupported by the findings of his study" and is an "unreliable" conclusion.
- Plaintiffs' asbestos testing expert, Dr. William Longo, cannot testify about the results of his polarized light microscopy (PLM) due to "real reliability and reproducibility issues plaguing Dr. Longo's PLM testing."
- Dr. Longo cannot testify that women who used talcum powder were exposed to "significant" amounts of asbestos because he "fails to offer any scientific support for his opinion that the use of Defendants' talc products causes exposure, let alone significant exposure, to asbestos."
- Plaintiffs cannot put before a jury their theory that inhalation of talc can cause ovarian cancer, due to the "scant" or "very little support" offered by plaintiffs' experts for that theory.

## ADDITIONAL INFORMATION

All verdicts against the Company that have been through the appeals process have been overturned. In addition, the most recent published cohort study, published in the *Journal of the American Medical Association*, pooled a number of high-level epidemiological studies and found no statistically significant increased risk of ovarian cancer with talc use.

Johnson & Johnson understands the talc litigation has caused confusion and concern about the safety of Johnson's Baby Powder and is committed to ensuring the facts about talc are understood. Johnson's Baby Powder has been a trusted product for more than 100 years, and decades of independent scientific evaluations have repeatedly confirmed that Johnson's Baby Powder does not cause cancer. Not a single professional organization or regulator has concluded that there is scientific evidence supporting the plaintiff claim of causation between talc and ovarian cancer.

We invite you to learn more about the science and safety of our talc at: https://www.factsabouttalc.com.

**About Johnson & Johnson**

At Johnson & Johnson, we believe good health is the foundation of vibrant lives, thriving communities and forward progress. That's why for more than 130 years, we have aimed to keep people well at every age and every stage of life. Today, as the world's largest and most broadly-based healthcare company, we are committed to using our reach and size for good. We strive to improve access and affordability, create healthier communities, and put a healthy mind, body and environment within reach of everyone, everywhere. We are blending our heart, science and ingenuity to profoundly change the trajectory of health for humanity. Learn more at www.jnj.com. Follow us at @jnjglobalhealth.

**Cautions Concerning Forward-Looking Statements**

This press release contains "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995 regarding the Daubert decision. The reader is cautioned not to rely on these forward-looking statements. The information contained in this press release is for informational purposes only and should not be construed as a commitment by the Company to engage in any specific strategy or course of action. Although the Company plans to vigorously defend itself against allegations raised in the federal multidistrict litigation, due to the inherent uncertainty of litigation, the Company cannot predict the timing, ultimate outcome or financial impact of this matter, or any other ongoing or future litigation. The forward-looking statements in this press release are based on current expectations of future events. If underlying assumptions prove inaccurate or known or unknown risks or uncertainties materialize, actual results could vary materially from the expectations and projections of theJohnson & Johnson Consumer Inc. and/or Johnson & Johnson. Risks and uncertainties include, but are not limited to: significant adverse litigation or government action, including related to product liability claims; risks related to the impact of the COVID-19 global pandemic; economic factors, such as interest rate and currency exchange rate fluctuations; competition, including technological advances, new products and patents attained by competitors; challenges inherent in new product research and development, including uncertainty of clinical success and obtaining regulatory approvals; uncertainty of commercial success for new and existing products; challenges to patents; the impact of patent expirations; the ability of the company to successfully execute strategic plans; the impact of business combinations and divestitures; manufacturing difficulties or delays, internally or within the supply chain; product efficacy or safety concerns resulting in product recalls or regulatory action; changes to applicable laws and regulations, including tax laws and global health care reforms; trends toward health care cost containment; changes in behavior and spending patterns of purchasers of health care products and services; financial instability of international economies and legal systems and sovereign risk; increased scrutiny of the health care industry by government agencies. A further list and descriptions of these risks, uncertainties and other factors can be found in Johnson & Johnson's Annual Report on Form 10-K for the fiscal year ended December 29, 2019, including in the sections captioned "Cautionary Note Regarding Forward-Looking Statements" and "Item 1A. Risk Factors," in the company's most recently filed Quarterly Report on Form 10-Q and in the company's subsequent filings with the Securities and Exchange Commission. Copies of these filings are available online at www.sec.gov, www.jnj.com or on request from Johnson & Johnson. Any forward-looking statement made in this release speaks only as of the date of this release. Neither the Janssen Pharmaceutical Companies nor Johnson & Johnson undertakes to update any forward-looking statement as a result of new

information or future events or developments. The Company expressly disclaims all liability in respect to actions taken or not taken based on any or all the contents of this press release.

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